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This essay utilizes the 1950 Korean War amphibious operation at Inchon as an illustrative case study to analyze how the challenges of an unknown amphibious battlespace can be overcome through hydrographic support and how hydrographic information is required by the operational commander in order to achieve mission success. Hydrography data is shown to be crucial for planning and decision making in the modern joint military environment and must be maintained as a key component of a competent amphibious force. This essay demonstrates a central thesis: Hydrographic support is a vital skill that must be maintained and exercised as a core competency for amphibious operations.

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Reinventing Amphibious Hydrography
The Inchon Assault and Hydrographic Support for Amphibious Operations

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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ABSTRACT

This essay utilizes the 1950 Korean War amphibious operation at Inchon as an illustrative case study to analyze how the challenges of an unknown amphibious battlespace can be overcome through hydrographic support and how hydrographic information is required by the operational commander in order to achieve mission success. Hydrography data is shown to be crucial for planning and decision making in the modern joint military environment and must be maintained as a key component of a competent amphibious force. This essay demonstrates a central thesis: Hydrographic support is a vital skill that must be maintained and exercised as a core competency for amphibious operations.

1. Introduction

Military planners have often been criticized for planning to re-fight the last war. The fear of being labeled as a backward or anachronistic thinker has driven officers to focus on progressive ideas, sometimes disregarding hard-learned lessons of the past. The lessons of amphibious warfare were written boldly after the many combat beach landings of World War II. However, the post-war threat of nuclear battle with the Soviet Union rendered amphibious warfare obsolete in the eyes of senior military planners.

One of the lessons disregarded during this time, the need of hydrographic support for an amphibious operation, would soon prove to be valuable. Conceived after the erroneous grounding of landing craft on reefs during the Tarawa assault during World War II, procedures for hydrographic support of the amphibious commander were hastily reinvented out of necessity for General Douglas MacArthur's bold Korean War landing at Inchon harbor in 1950.

In the years since Inchon, the state of amphibious warfare has slowly regressed back to a neglected status. In an October 2007 press release, the Commandant of the Marine Corps, General James T. Conway, stated that he was concerned that in the wake of the Iraqi War his service was becoming a “second land army” and was losing its expeditionary character and its “ability to launch amphibious support”.[1] This call for a renewed Marine Corps emphasis on amphibious operations comes nearly 60 years after MacArthur's amphibious success. Being a complicated, inherently joint operation, the many aspects of amphibious warfare must be revisited and examined if proficiency is to be regained. The Inchon assault provides an illustrative case study to analyze how the challenges of an unknown amphibious battlespace were overcome through hydrographic support and how

hydrographic information was required by the operational commander in order to achieve mission success. The Inchon operation is used to demonstrate a central thesis: **Hydrographic support is a vital skill that must be maintained and exercised as a core competency for amphibious operations.**

2. Analysis and Discussion: Amphibious Hydrography Reinvented at Inchon

World War II provided many hard won lessons on the importance of hydrography to amphibious warfare. The battles for the Solomon, Gilbert and Marshall Islands were a bloody type of on-the-job training for the Army and Marine Corps. The Battle of Tarawa was particularly bloody due to poorly calculated tidal data and inadequate, outdated nautical charts that utilized soundings from Lieutenant Charles Wilkes' 1841 hydrographic survey.[2] Most of the amphibious vehicles and landing craft grounded prematurely on an outer reef 600-800 yards from the Tarawa shoreline, forcing Marines to wade through the surf to the beach under heavy enemy fire.[3] Admiral Chester Nimitz and General MacArthur drew upon these mistakes to make a number of major improvements for future amphibious operations. In August 1944, Nimitz assigned the task of obtaining hydrographic information to the Navy's Underwater Demolition Teams, but allowed his three amphibious commanders latitude in the organizational structure of their hydrographical forces.[4] One of the amphibious commanders, Rear Admiral Kelly Turner, designated a full staff position to his hydrographer, Commander Ira Sanders, who contributed greatly to the planning and success of the final island assaults at Iwo Jima and Okinawa. Unfortunately, these practices were not codified at the time in a combat survey manual or service publication.[5]

One of the reasons Sanders did not produce a manual earlier was that following World War II, amphibious operations were considered to be highly unlikely. Typical of this

attitude was Secretary of Defense Louis A. Johnson, who stated in 1949 that “we'll never have any more amphibious operations” during his attempts to dismiss the Marine Corps as a necessary service.[6] Therefore, senior military leaders and planners saw little need to retain amphibious skills or prepare for such an operation.

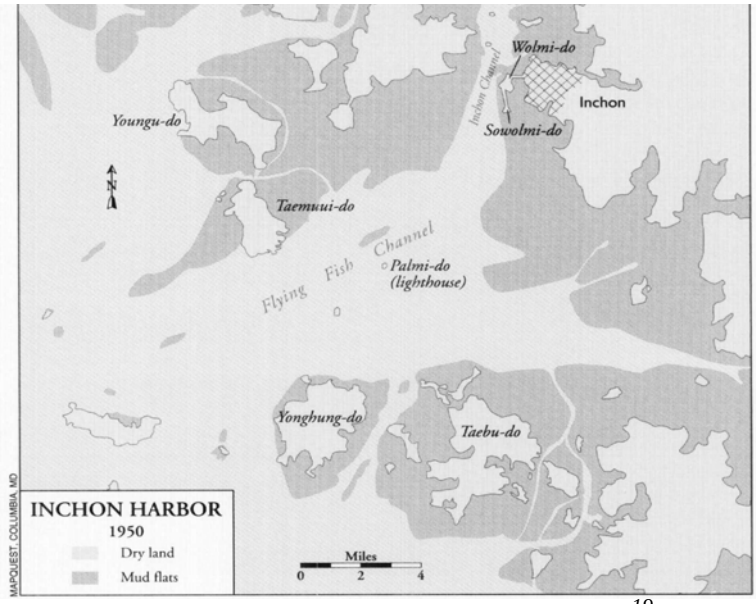
However, a year later in Korea, General MacArthur found himself planning just that kind of operation. Nineteenth Century warfare theorist Antoine Henri Jomini said that the two keys to an amphibious attack are deception and hydrographic knowledge[7] and for his momentum changing assault, MacArthur chose to make use of both in putting troops ashore at the “unlikeliest harbor on the peninsula: Inchon”.[8] The tidal range was the second highest in the world at 33 feet. Strong currents of up to eight knots flowed through Inchon harbor's approach, Flying Fish Channel, while mudflats and banks extended thousands of yards from Inchon's seawall.[9] Captain Norman Sears, one of the Inchon planners stated that, “Flying Fish was well named. A fish had to fly to beat the current and check his navigation past the mud banks (and) islands”.[10] Furthermore, the gradient of the seabed approaching Inchon sloped very gradually, so that a high tide of 23-29 feet, which occurred only a few days per month, was required to support landing craft.[11] Rear Admiral James Doyle, who would execute MacArthur's plan, feebly backed his boss and referred to the invasion as “not impossible”.[12] MacArthur however, recalling the amphibian successes of World War II and how the Navy had overcome challenging hydrography across the Pacific, was confident. “The Navy has never let me down in the past, and it will not let me down this time”.[13]

The Navy, lacking a structured systematic approach to hydrography in the amphibious battlespace, struggled to match MacArthur's confidence and meet his expectations. The first step to reinventing hydrographic support was to find a way to address

the numerous hydrographic concerns summed up by one of Doyle's staff officers: “We drew up a list of every natural and geographic handicap and Inchon had 'em all”.[14]

General MacArthur was fortunate to have a staff member, Captain Robert Miller, USAF, who studied at Scripps Institute of Oceanography and provided a comprehensive database of locally published data. The planning staff needed hydrographic details to address their geophysical concerns and Miller served as a sort of clearing house for hydrography and oceanography data, publishing reports on currents, sea conditions, tides, water temperature, transparency, bottom sediments, and underwater contours.[15] The support from Miller, acting as an undesignated “staff hydrographer”, was invaluable in allowing planners to construct a base plan that would later be fine tuned with real time information.

Since much of the data collected by Captain Miller was sparse or outdated, a haphazard plan was conceived to place Navy Lieutenant Eugene Clark on a small island near Inchon fourteen days before the invasion. Clark, who was enlisted during World War II and had amphibious experience, was ideally suited for the mission.[16] Clark's first job was to check the current chart, based on sounding data from a 1916 Japanese survey. Considering that the Han River delta north of Inchon had deposited silt for over 34 years since the survey, the channel and approach required careful verification, with new obstacles charted and identified.[17] Clark utilized a South Korean patrol craft to conduct a clearance survey by transiting the channel, often times under enemy fire, and verifying depths. Neither Clark nor the South Koreans discussed the fact, but the clearance survey also served as a sweep for mines.[18]



Inchon Harbor Approach and Mudflats[19]

With the nautical chart verified, Clark began his amphibious beach surveys. Two vital pieces of information were required in Tokyo: tidal verification and beach composition. Clark commandeered local sampans and personally conducted night beach surveys in the mud flats around Inchon, radioing his information back to Tokyo for planners. He measured the extent of the mudflats and shoals while also reporting the harbor clear of underwater obstructions and mines. He also provided a detailed description of the beach slope and composition, enabling landing craft to properly trim their vessels and not broach too far out to sea.[20] Marines later stated that “they knew exactly what they were doing” thanks to Clark's information.[21]

Two landing craft lie beached on one of the many mud flats surrounding Inchon. The information gathered by Clark and his partner, Lieutenant Joun Joung, about the peril that the mud flats posed for landing soldiers was critical in planning MacArthur's amphibious operation. [22]

Even more important to operational planners, Clark conducted tide observations and reported that Japanese tide tables were more accurate than American versions,[23] enabling the 1st Marine Division's Fifth Regiment to make informed critical decisions and pinpoint their invasion timing at the two necessary high tides on D-Day.[24] Marines moved their landing craft in and out of the harbor and up to the seawall beaches without incidence based on the reconnaissance data. Referencing Clark's tidal data and his beach survey, Marine commanders decided on an ideal location to beach a landing craft loaded with ammunition and supplies, providing the logistic backup to sustain the beachhead.[25]

Although woefully unprepared to support an amphibious operation, the success of the joint force's ad-hoc approach to the extreme hydrographic challenge of Inchon was ultimately measured by the success of the landing. After hearing that elements of the 1st Marine

Division had successfully established a beach head with minimal casualties, MacArthur may have just as well been talking to Lieutenant Clark, Captain Miller and the others that overcame the geographic pitfalls of Inchon when he stated that the American amphibious forces "have never shone more brightly".[26] Marine Corps Brigadier General Edwin Simmons accurately stated that the "anticipated hydrographic conditions were much more frightening than the quality of expected enemy resistance".[27] His statement highlights the importance of the challenges that the hydrographic support team mastered. The specter of landing craft grounded and smashed in the surf, miles offshore or hopelessly stuck in mud banks, was averted and the amphibious attack was a stunning success.

Since hydrographic reconnaissance played such an unpublicized role in the Inchon invasion, a counterargument could be made that it was unimportant or superfluous to the operation. Indeed, Lieutenant Clark only received a Silver Star and Legion of Merit for his death defying reconnaissance in enemy territory. However, as a Lieutenant, Clark was the ranking officer during his beach reconnaissance and did not have a senior benefactor that knew all the details of his mission. To illustrate this point, Clark would later receive a Navy Cross while escorting a brigadier general in a far less dangerous reconnaissance.[28]

The hydrographic data Clark transmitted back to Tokyo and to the operational planners could only be described as vital to overcoming the many listed natural obstacles to the invasion. Indeed, one of the main reasons that MacArthur's Inchon plan is viewed as a stroke of genius is that he trusted his operational forces to overcome the hydrographic challenges of Inchon, something the North Koreans clearly believed was impossible. In his book about the influence of physical nature on battle, author Harold Winters stated that "MacArthur used the forbidding hydrography at Inchon to great advantage. The tides,

mudflats, and limited access channel to the port all but excluded Inchon as an invasion site", allowing MacArthur to surprise the enemy with a seemingly impossible maneuver.[29]

Although Clark's part in the operation was not publicized to a large extent, he was not unlike a baseball umpire in that his role would only be well known if he had done his job poorly. The success of the operation made his role more transparent. It was likely that many recipients of Clark's information never knew its source and subsequently never knew for whom to express their thanks for the delivery of the desperately needed data. The fact that his accomplishment received little fanfare does not diminish the tremendous impact Clark's reconnaissance had on operational planners and decision makers. His memoir of the operation was appropriately titled "The Secrets of Inchon" as it reflected the reality that his successful hydrographic support mission truly was one of the secrets to Inchon's success.

The vital role that hydrographic reconnaissance played at Inchon gave new hope to those who wanted to reinvigorate the amphibious staff hydrographer concept that Rear Admiral Turner used with success in the closing battles of World War II in the Pacific. Five years after Inchon, Commander Sanders produced a document for the Naval Hydrographic Office delineating the roles and responsibilities of the "Force Hydrographer" for "Amphibious Wartime Conditions".[30] In his document, Sanders proposed a role for a staff or force hydrographer that would serve as the "clearing house" for all geodetic data to be used as part of the intelligence assessment and operational planning effort, much like Captain Miller had done on MacArthur's staff at Inchon.[31] However, any momentum gained by the success of Inchon was dulled by the lack of amphibious operations in the following decades. The staff hydrographer role never materialized with any staying power and, although beach reconnaissance continued to be advertised as a function of Navy Special Warfare (SEALS)

and Marine Corps reconnaissance platoons,[32] the skill set and knowledge of hydrographic amphibious support gradually disappeared with disuse.

The success of Lieutenant Clark and Captain Miller hydrographic work solved many of the operational problems facing the planners of the Inchon operation. Upon examining the scope of the information, the quality and relevance of Clark's beach and tidal reconnaissance information and the thoroughness of Miller's oceanographic data consolidation, planners realized that they were handed an operational intelligence coup that thoroughly prepared this particularly challenging battlespace for the amphibious force. The intelligence section of the 5th Marine Regiment's operations order relied heavily on Clark's beach survey to ensure that assault forces were informed of specific challenges of the operational environment: “A mud flat extends some 1,000 to 1,200 yards seaward. Beach RED affords no natural beach at high water due to the sea wall and only the precarious mud flats during low water periods. This cobblestone type sea wall extends the entire length of the beach and has a gradient of five on one.”[33] Former Marine Corps intelligence officer Kevin Stack, in his article titled “Intel Cinches Inchon”, praised Clark's contributions, stating that his beach survey intelligence “resulted directly in operational decisions crucial to the success of the Inchon invasion”.[34] Several important factors contributed to the operational success at Inchon, but one of the most important was geographic and hydrographic intelligence.

3. Analytical Conclusions: Lessons from Inchon

The Inchon operation has been described as a classic example of operational planning. Indeed, the Joint Military Operations curriculum uses Inchon as an example of General MacArthur's brilliance and strategic intuition.[35] At the center of this stunning success, there are three main conclusions from Inchon concerning the use of hydrographic

support for the amphibious commander: 1) hydrographic support is an indispensable component of amphibious operational planning; 2) hydrographic data is of critical importance to the operational commander's decision making process; and 3) understanding hydrography is a core competency of amphibious operations and this relationship needs to be sustained to support the viability of amphibious operations.

Inchon demonstrates the importance of hydrographic support to the planning process, as hydrographic conditions were the centerpiece of the effort to prepare the battlespace. Queries came from all levels of the chain of command, from the Marine landing teams to President Truman.[36] Defining the operational environment would necessitate the gathering of all available hydrographic information, which MacArthur staffer Captain Miller diligently accomplished. The paramount importance of hydrography as an environmental effect is evidenced by the resources dedicated toward information gathering. Lieutenant Clark commanded four men on the ground while being granted limited tactical control of a South Korean patrol craft in order to accomplish his hydrographic reconnaissance mission. Air strikes were flown to defend Clark and his group and a destroyer was even dispatched just before the invasion to safeguard the surveyors. Several aircraft flights were tasked by MacArthur's geographic branch to photo survey the area, adding more perspective to the incoming data. More attention and assets were tasked toward obtaining hydrographic information than spotting troops and gun emplacements.[37] Throughout the planning process for Inchon, hydrography was clearly identified as a leading information requirement and therefore was fulfilled with high priority in order to successfully accomplish the amphibious mission.

During the assault, hydrographic information was clearly critical to the timely decision-making process leading to mission accomplishment. Hydrography and extreme tides affected the logistics sustainment decision process, ultimately leading to the necessity of beaching a landing craft in the mud.[38] The tidal observations directly influenced the decision to divide the assault into two phases utilizing the two high tides at morning and dusk.[39] In the incredibly challenging environment of Inchon, operational decisions keyed on tides and beach geography to an indispensable extent, making hydrography a most vital operational decision making tool.

The Inchon invasion very nearly became a negative lesson with regard to maintaining a military proficiency. A good operational commander, like General MacArthur at Inchon, will push the envelope of operational planning and drive staffs to solve complex problems whose solutions may require a variety of information to satisfy their requirements. Upon hearing of MacArthur's decision to land at Inchon, the operational staff groped clumsily for an ability to obtain hydrographic intelligence. The skill set of hydrographic preparation of the amphibious battlespace had been neglected for five years after World War II and struggled to reinvent itself at Inchon until a Navy Lieutenant and an Air Force Captain stepped forward. Lacking the hydrographic data obtained from the fortunate discovery of these two officers, successful mission accomplishment would have been much more questionable.

To further emphasize the importance of maintaining core competencies, the thinking and problem solving process of the commander bears examination. Successful commanders, like General MacArthur at Inchon, often make decisions based on strategic intuition, which is a way to intellectually leverage past experience and learning. Strategic intuition quickly

draws comparisons of new information to past events or knowledge and builds a successful plan based on similarities.[40] If a capability is part of a nation's Range Of Military Operations (ROMO), but has been degraded due to neglect of its core competencies, the strategic intuition process is precluded or even counter-productive. This very nearly occurred at Inchon as MacArthur recalled the Battle of Quebec, where success hinged on attacking in an unanticipated direction and applied it to an amphibious capability that he had witnessed in World War II. However, a core competency, hydrography, had very nearly been lost and could have led MacArthur's operational strategic intuition down a disastrous path.

Inchon further demonstrates that a capability may degenerate quickly with neglect. Hydrographic support for an amphibious operation requires training and experience, traits that cannot be produced in an emergency or crisis. Experts and knowledge, if not prioritized, will disappear from a force within a 3-5 year enlistment period. The erosion of hydrography in the amphibious battlespace, from a mission that warranted the direction of Admiral Nimitz in 1944 to a forgotten skill in 1950, emphasizes the speed at which a critical information capability may evaporate if lessons learned are not retained and heeded.

Inchon is illustrative of hydrography's expansive role in amphibious operations, but it is not a unique example. Since amphibious operations are so vulnerable to unforeseen physical conditions, the information from hydrographic surveys is critical and paramount to success. Hydrography plays a lead role for amphibious battlespace preparation and planning, is vital to the decision making process of the operation amphibious commander, and is a key component in maintaining a force's viable amphibious capability. Sun Tzu's famous adage on terrain is also relevant for the role of hydrography, whether it be in the "total victory" at Inchon or a future amphibious battle: "Know the ground; your victory will then be total".[41]

4. Recommendations and Lessons

As stated earlier, in the wake of the Iraq War, the Marine Corps is making a concerted effort to regain their traditional mastery of the amphibious environment. Therefore, the present time offers an excellent opportunity to re-engage hydrography with the amphibious operator. As the Navy and Marine Corps rebuild the foundations of amphibious operations, it is critical to build a framework that takes advantage of all available tools and capacities in order to establish a capability that is successful across a wide spectrum of missions.

Drawing on the three conclusions from the Inchon historical example, hydrographical support needs to be structured and maintained as a proficiency for future amphibious operations, ready to be deployed in order to supply critical information for operational decision makers and planners.

Hydrography remains a requirement for contemporary amphibious planning. The introductory sentence of the US Navy's Joint Surf Manual states that "For planning and execution of an amphibious operation, knowledge is required of surf and hydrographic conditions".[42] The nature of modern amphibious operations emphasizes the use of Amphibious Assault Vehicles (AAVs) to bridge the transition from sea to shore. AAVs are particularly reliant on hydrographic intelligence. According to the Marine Corp Warfighting Publication (MCWP) on AAVs, "hydrography...will be required to effectively employ AAVs to negotiate the seaward approaches and to move from the surf zone to inland objectives".[43] The MCWP identifies surf observations and beach surveys as "must haves" for operational success, implying the necessity for some sort of organic hydrographic support in the force.[44] The Joint Publication for Amphibious Operations agrees on the importance of hydrography to planning, identifying hydrography as "a factor that must be considered" when planning an

operation.[45] Additionally, the Joint Ship-to-Shore Movement Warfighting Publication dictates that the key, specific planning considerations regarding the maneuver from sea to shore are mainly affected by the considerations of "hydrographic features of the beach approaches" and beach characteristics.[46]

Currently, a staff intelligence officer would consider the effects of hydrography on an amphibious plan as part of the Joint Intelligence Preparation of the Operational Environment (JIPOE) process. However, considering the importance emphasized in publications and the required nature of this information, there needs to be a formal mechanism to inject a qualified and trained hydrographic perspective into the JIPOE and operational planning process. Major staffs, such as Expeditionary Strike Groups (ESG), include a Meteorology and Oceanography (METOC) officer, usually from the LHA/LHD Operations Department. The METOC officer either has a hydrographic background or can reach back to qualified military hydrographers for analysis and direction. Future doctrine needs to codify the involvement of an officer with a Military Hydrographer (MH1) Additional Qualification Designator (AQD) in the fundamental planning steps of an amphibious operation in order to provide an accurate and timely assessment of hydrographic conditions to base further operational planning.

Hydrography today is crucially relevant as an acute contributor to operational decision making. A Commander's Critical Information Requirement (CCIR) is defined as an information requirement critical to the "decision-making process that affect successful mission accomplishment".[47] The MCWP for AAVs states that, "the success or failure of an amphibious landing...largely depends on the completeness and accuracy of (hydrographic) intelligence data and upon … interpretation of that data".[48] The Joint Ship-to-Shore Movement Publication states that "hydrographic features of offshore areas" are "principal

considerations" that shape the operational decisions of ship-to-shore movement.[49] Marine Corps and Navy guidance is clearly focused on hydrography as a priority intelligence requirement and a potential CCIR. At Inchon, if Lieutenant Clark had radioed back the discovery of previously unknown obstacles, severe beach conditions or radical offshore hydrography that could potentially preclude the amphibious operation, the information would have had CCIR flash priority to be passed to General MacArthur. Upon receipt of such information, MacArthur would have likely restructured or canceled the assault. Clark's reconnaissance was a clear decisive point for the Inchon operation as it confirmed to MacArthur that Inchon could be successfully attacked from the sea and also supplied the key information to make correct operational decisions for the attack.

It is therefore essential that an operational staff be able to accurately interpret hydrographic data to aid the operational commander in mission critical decisions. An MH1 qualified officer needs to be utilized organically or deployed to a staff during an amphibious operation. Preferably, this officer would have participated to some extent in the amphibious operation planning process and already have situational awareness of the operation. Once deployed or activated organically, the function of the hydrography staff officer would be very similar to the role envisioned by Commander Sanders after the Korean War. The hydrographer would serve as the clearing house for all hydrographic data, whether derived from open source, satellite, air, unmanned vehicles or beach surveys done by SEALS or Marine Reconnaissance. The hydrographer would assess the quality of the data and then work closely with the staff intelligence officer to ensure the latest information is available and properly understood for critical decision making. The advantage of a staff hydrographer over a reach back capability is communication speed. While planning an operation, time can

be allotted for reach back and consultation. However, during actual amphibious operations, when decision making time is limited and insights and assessments are required in real time, a staff presence is vital toward addressing information at the CCIR level.

Lastly, having established a joint requirement for a hydrographic presence during amphibious planning and decision making, there must be an understanding at the joint level supporting this requirement. The critical strength of an amphibious force is an ability to come from the sea and project power ashore. Hydrography is a critical capability, supporting this strength and enabling it to leverage its advantage toward mission success. An active effort must be realized to ensure this critical capability remains functional in the amphibious domain.

The Navy's hydrographic survey command, Fleet Survey Team (FST), established an Expeditionary Division in late 2007 that maintains several MH1 qualified officers able to support an amphibious mission. In November of 2007, FST military hydrographers successfully provided on-site support to the 11th Marine Expeditionary Unit (MEU) during amphibious exercises in the Maldives Islands and Bangladesh. The positive results of these exercises need to serve as the basis of an understanding of hydrography in the amphibious arena. Currently, there are precious few capabilities leveraged against the amphibious hydrography requirement. FST's continued participation at the MEU level within an ESG will continue to refine the techniques and procedures to reinvigorate amphibious warfare while providing the operational commander the required hydrographic intelligence for mission success.[50]

As amphibious operations are reengaged within the Marine Corps, amphibious planners and FST military hydrographers need to train toward the hydrographic support

requirement, stepping into the breach to become part of a permanent developing doctrine. The risky prospect of reinventing a hydrographic capability when tasked with an amphibious operation is not an option in today's ready response military. Innovations and new technologies, such as unmanned underwater vehicle sensors, need to be vetted and lessons learned applied to further develop hydrographic capabilities and maximize the contribution across the planning and execution phases of an amphibious operation.[51] Hydrographic expertise, as a critical capability for decision making and key component in the JIPOE process, must be ready on the shelf to enable amphibious operations as an effective option in the range of military operations.

5. Conclusion

The historical lessons of Inchon reveal valuable conclusions with regard to the fundamental importance of hydrography to an amphibious operation. Hydrography has been shown to be crucial for planning and decision making, fulfilling critical information requirements.

Most importantly, hydrography is clearly recognized as a core competency of amphibious operations. This knowledge base and skill set must be maintained if amphibious operations are to remain an option in the American range of military operations. To neglect a critical component of amphibious warfare while promoting amphibious capabilities is inherently risky for the planner examining the environment, dangerous for the operator needing information for decisions, and potentially disastrous for the commander in leveraging strategic intuition while practicing operational art.

As the Navy and Marine Corps begin to re-emphasize amphibious capabilities, it is an opportune time to re-examine history and note the successful practices of previous

amphibious operations. Future amphibious operational planners and executers need to ensure that the key components and personnel are ready and in place to provide a planning and decision making foundation that leads to successful mission accomplishment.

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[35] Floru and Hartig, *Operation Chromite,* 1.

[36] Bates, *HYDRO to NAVO,* 116.

[37] Clark, *Secrets of Inchon,* throughout.

[38] Ibid, 250.

[39] Heinl, *Victory at High Tide,* 46.

[40] Floru and Hartig, *Operation Chromite,* 5.

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[44] Ibid, 3-4.

[45] US Military Joint Publication 3-02, *Joint Doctrine for Amphibious Operations* (Chairman Joint Chiefs of Staff, September 2001), I-4.

[46] NWP 3-02/MCWP 3-31.5, *Ship to Shore Movement*, 1-3.

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[48] MCWP 3-13, *Employment of Amphibious Assault Vehicles,* 3-2.

[49] NWP 3-02/MCWP 3-31.5, *Ship to Shore Movement,* 1-3.

[50] Interview and email exchange with Lieutenant Commander Jason D. Gipson, MH1 hydrographer assigned to Explosive Ordinance Disposal Unit 3, NAB Coronado, CA. October, 2008.

[51] Ibid.

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