

Optimizing Future Armored Reconnaissance

Efforts to offset capabilities

by LtCol Ladd Shepard

It is anticipated that in the future operating environment the MAGTF will either be directly engaged with near-peer adversaries or with adversaries equipped with near-peer capabilities. As the Marine Corps evolves to meet the challenges of the future operating environment, the ability of light armored reconnaissance (LAR) units to provide supported commanders with the necessary combat information and intelligence to apply combat power for decisive effect across the range of military operations will be critical to decision cycles that outpace adversary tempos. Current modernization efforts underway to support Marine Corps armored reconnaissance are required but are insufficient for the GCE to holistically meet future challenges. In order to optimize the armored reconnaissance unit's ability to supply useful near-realtime combat information and work through enemy reconnaissance and deception efforts to shape the operating environment for the supported commander, additional

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doctrinal, organizational, training, and materiel changes are necessary across GCE reconnaissance formations.

Current Modernization

Twice since 2016 the Marine Corps has decided to forego significant investment in the LAR battalion's Family of Light Armored Vehicles (FOLAV) to invest in modernization as the desired initial increments of future capability were not readily available to meet the Marine Corps' operational needs. Thus, relatively low-cost investments in communications, precision lethality, and fleet sustainment—along with adaptation in tactics, techniques, and procedures—serve as a bridge to modernization for LAR units to remain operationally relevant in a fight tonight against near-peer adversaries. Working

toward modernization, the Marine Corps has four principal efforts currently underway to advance armored reconnaissance sense, make sense, and affect capabilities.

First, the Marine Corps combat developer is producing an armored reconnaissance concept that describes employment of “next generation armored reconnaissance capability in future operations as prescribed in the MOC.” The concept will

address potentially significant advances in threat capability areas of cyberwarfare, targeting, and munitions that LAR will encounter in the future operating environment and how next generation Marine Corps armored reconnaissance will evolve and adapt to operating within this environment.¹

The concept is a foundational effort to describe how LAR formations will sense and affect in complex and highly contested environments against threats with greater reach and lethality, serving as a basis from which to develop future capabilities across the institutional doctrine, organization, material, leadership, personnel, and facilities pillars.

Second, the Marine Corps has recently updated the mission statements for LAR battalions and companies and has also revised the Marine Corps Force 2025 (MCF2025) LAR battalion and company designs. The revised force design is a zero-sum initiative that realigns existing personnel and equipment in order to address Service guidance for desired capabilities in the future force,

The mission of the Light Armored Reconnaissance Battalion is to conduct armored reconnaissance, counter-reconnaissance, surveillance, security operations in support of maneuver, offensive and defensive actions in order to shape the battlespace for the supported unit commander.

—2018 LAR Bn Mission Statement



U.S. Marines with Headquarters Battery, 5th Battalion, 11th Marine Regiment and 1st Light Armored Reconnaissance, 1stMarDiv, execute a simulated raid in support of Fire Exercise (FI-REx) 2-18 at Marine Corps Base Camp Pendleton, CA., 19 April 2018. (Photo by LCpl Alexa Hernandez.)

capability and capacity shortfalls identified in multiple wargames and Service exercises, and incorporates additive MCF2025 design structure on functional platforms. The organizational changes preserve the readiness to fight tonight with flexible task organized forces and additional capability.

Third, the Marine Corps is approaching a material development decision on a purpose built armored reconnaissance vehicle (ARV) to replace the legacy FO-LAV in the LAR battalions. The ARV is envisioned as a modern manned combat vehicle,

capable of passively collecting and fighting for information that balances competing capability demands to sense, shoot, move, communicate and remain transportable as part of the naval expeditionary force.²

Highly mobile on and off road with greater shore-to-shore water mobility than the FOLAV, the ARV will serve as a platform from which robotic combat systems, such as unmanned aerial systems (UAS), unmanned ground vehicles (UGV), and unattended ground sensors (UGS), can be employed or information processed to expand the ability to sense further across a broader spectrum, as

well as provide a basis for responsive and accurate direct, traditional indirect, and future beyond line of sight fires. It will incorporate greater networked command, control, communications, computers, and intelligence capability to facilitate operations within the expanded future operating environment security area and enable the rapid transfer of information to supported commanders and their staffs. Equipped with precision loitering munitions, beyond line of sight heavy anti-tank munitions, a medium-caliber cannon capable of delivering programmable air-burst munitions, information warfare and full spectrum electronic warfare technologies, the ARV will be highly lethal to affect sensed adversaries with kinetic and non-kinetic effects.³ To ensure delivery of an initial capability at the desired time, the Office of Naval Research (ONR) has been instrumental in the initial science and technology efforts to understand what is within the realm of possibility, what may be incremental or spiral development efforts, and reduce risk to an ARV acquisition program. ONR facilitated an innovation workshop in December 2017, multiple industry day information sharing sessions, an industry and government sup-

ported whole system trade study which concluded in January 2019. At the time this article is being written, ONR is in the process of letting contracts to two vendors that will provide technology demonstrators in late 2020 for government testing which will focus on high risk capability areas in 2021.

Finally, the Marine Corps Warfighting Laboratory (MCWL) Rapid Capabilities Office (RCO) is coordinating the development, procurement, and delivery of a UAS with a lethal payload in the form of an organic, precision, beyond line of sight loitering munition to engage armored and material threats at extended ranges. It is envisioned that this munition will incorporate a version of the ONR Low Cost Unmanned Swarming Technology (LOCUST) project architecture which will enable the LAR formation to sense at greater ranges and access on-demand effects on adversaries deeper in the security area, or even area of interest outside a Marine division's (MarDiv's) traditional area of influence providing increased depth of shaping fires to the supported Commander. As part of this effort, the RCO seeks to field an extended range and duration reconnaissance surveillance target acquisition (RSTA) platform with LOCUST interoperability that provides an organic Group 2 UAS with Group 3 capabilities that enables greater situational awareness of the operating environment at operationally relevant distances to an armored reconnaissance force conducting reconnaissance, counter-reconnaissance, and security missions.⁴

Current Shortfalls

This article previously-mentioned efforts that are insufficient by themselves to keep LAR operationally relevant against near-peer adversaries in the next ten to fifteen years. Multiple table top exercises, Service level wargames, simulation experiments, Service experiments and training exercises, and operational deployments have highlighted the value of, and return on investment in, LAR units. The question, as the future operating environment becomes the current operating environment, is not whether the Marine Corps needs an armored

reconnaissance capability, but rather how the Marine Corps enables LAR to maneuver as a dedicated reconnaissance and counter-reconnaissance formation to aggressively shape the battlespace and deny adversaries the ability to fully understand their operating environment. The following items within the institutional doctrine, organization, and training pillars are not all encompassing, but rather an excerpt of those findings which the Counter Reconnaissance Wargame, 21st Century Fires Wargame, and Future GCE Reconnaissance Wargames as well as Exercises DESERT SCIMITAR 16, MEFEX/LSE-16, DEEP STRIKE II, STEEL NIGHT 2017 and 2018, and TRIDENT JUNCTURE 18 have highlighted—in the author’s professional assessment—as important areas for institutional examination, experimentation, investment, and change because of their commonality throughout the exercises, wargames, and simulations.

Regarding the doctrinal pillar, there are three current shortfalls the Marine Corps should prioritize. First, recent wargaming efforts demonstrated the need for an expanded battlefield framework. The future operating environment validates the single battle construct but further blurs the lines between rear, main, and forward battle areas as well as significantly expands them beyond the current friendly oriented operating environment to what the enemy can sense and affect across a likely non-contiguous battlespace.

Second, is lack of a counter-reconnaissance doctrine. Today, counter-reconnaissance is considered by most as just an inherent security task in security missions and is codified by the lack of any Marine Corps unit having, “a specified task of conducting counter-reconnaissance.”⁵ While there is an inextricable link between reconnaissance and counter-reconnaissance, it is wholly insufficient to define counter-reconnaissance by screen, guard, or cover tactical tasks. These tasks are friendly oriented security missions in that they seek to provide “early warning” or prevent adversary reconnaissance forces from interfering with friendly main body actions by presenting a surface and shaping the operating environment for the friendly

supported unit. They do not account for the adversary’s attempts and means to sense the friendly situation and disposition, or essential elements of friendly information.⁶ In other words, it fails to

deny the adversary’s ability to obtain, by visual observation, electronic sensing, or other detection methods, information about activities and resources of friendly forces or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area.⁷

Third, the Marine Corps lacks a doctrinal concept for how it will employ loitering munitions and swarming capabilities. In January 2019, the LAR community participated in a simulation experiment using loitering munitions in support of the ONR LOCUST project. While the clearance of fires concept of employment was based on current procedures for clearing fire support assets, there were some nuances that require deeper analysis, procedural institutionalization, and coding into the LOCUST algorithms for when that technology transitions to operational use in the near future. As an example, air space deconfliction and the on-demand servicing of LOCUST, from any munition launcher its algorithm determines appropriate, are in conflict and impossible for the fire support coordinator, air officer, or joint terminal attack controller to manage as the number of munitions in the air increases. Another example is the LAR formation will be fielding the initial loitering munition capability within the GCE in the near future. This is seen by the LAR community as an organic precision fire capability to be employed as part of their combined arms approach to executing their missions and tasks. The current LOCUST architecture does not necessarily uphold a strict organic, or rather direct support, concept of employment in that the LOCUST algorithm processes “calls for fire” and pulls from an available source it deems appropriate. Thus, the LAR loitering munitions could suddenly be launched to support an adjacent unit, or service a higher headquarters target without any input or consideration for the LAR formation’s current situation.

With regard to the organizational pillar there is one shortfall that stands out. Recent wargaming efforts, as well as recent operational deployments, highlight the lack of a standing organization within the GCE that can effectively manage and task collection efforts to support all echelons of GCE command information requirements and integrate them with fires and maneuver. Col Matthew Jones’, USMC(Ret), (*MCG*, Feb17) article, “Reconnaissance/Counter Reconnaissance Task Force: Confronting the Hybrid War,” discusses a warfighting challenge that “directs, consideration of the formation of a ‘Reconnaissance Task Force’” and presents different options to achieve the desired effect. However, by name alone there exists a conflict with the MCWL draft Counter-Reconnaissance Tentative Manual as the ad hoc nature of a task force and the need for more than just “augmenting capabilities.”⁸ Nonetheless, the central idea between Jones’ article, MCWL’s draft Counter-Reconnaissance Tentative Manual, and a solution concept recommended later in this article asserts that there is a need for “seamless integration of ISR (intelligence, surveillance, and reconnaissance), fires, and maneuver assets under the command of a maneuver commander to enable the location, classification, and engagement through fires and by fire and maneuver” of adversaries in the future operating environment in order to not only sense the adversary but to also prevent his sensing abilities and deny his, current operations and intelligence picture.”⁹ There have been times when LAR was solely considered an additional maneuver element and not tasked in the G-2/S-2 collections plan. There have been times of tension between the G-2/S-2 and G-3/S-3 for employment of the supporting LAR formation. Either way, there has been a resounding lack of seamless integration of the MarDiv’s asset that moves to sense the enemy first, shapes the operating environment for the supported commander, and fights for information as a critical component of the supported commanders intelligence system.¹⁰

The training institutional pillar has a singular shortfall that has current and

future force impacts. LAR possesses 0311 Infantrymen who act as scouts in order to conduct the critical tasks associated with its reconnaissance and security missions. Currently, those scouts are insufficiently trained to execute their missions. They rely solely on non-standardized on-the-job training executed within their battalions based on time and resources available. The Light Armored Reconnaissance Operational Advisory Group registered a need for a formal entry-level course of instruction that establishes a baseline of proficiency, is sustained within the battalions, and advanced as required through other existing courses. This is an immediate requirement the Marine Corps must address. With the implementation of the LAR Marine 0313 MOS from cradle-to-grave, those senior enlisted Marines who previously served as scouts and were infantry unit leaders with the 0369 primary MOS are all but gone. Thus, those who remember what and how to conduct the critical tasks associated with LAR's missions prior to the years spent in Afghanistan and Iraq are almost no longer around to ensure training plans sufficiently provide the necessary training for the LAR scouts. The lack of scout training will exacerbate as LAR modernizes and the ARV is fielded. The platform will no longer rely heavily on the scouts, the VC's binoculars, and the 25mm main gun thermal sight. The platform will possess multiple sensors across the electromagnetic spectrum that are fused within a battle management system. The scouts will become UAS and UGV sensor operators. There will be a necessary need for the scouts to remain in the community to become increasingly proficient with the multitude of sensors and weapons. However, there likely remains a need for a dismounted scout to support the platform in canalizing terrain, conduct local security, interact with local populace, and conduct sensitive site exploitation on objectives to name a few tasks. Whether the LAR scout is to be a sensor operator, conduct critical reconnaissance mission tasks manually, or conduct sensitive site exploitation, they are insufficiently prepared to do so now and more so in the future.

Recommended Efforts

Considering current efforts and the above highlighted institutional pillar shortfalls, the following section contains recommendations for a way ahead. This section addresses not only doctrinal, organizational, and training shortfalls, but also recommends materiel efforts that are not necessarily current shortfalls but will be in the future operating environment if the Service fails to expand the scope of its current efforts. Finally, this section recommends a way for the Marine Corps to maintain its campaign of learning momentum and transitioning many of the recommendations into implementation.

Regarding the doctrinal shortfalls, there are five recommendations. First, the Marine Corps should analyze and update the battlespace framework which would then likely drive doctrinal changes across MAGTF entities. Second, the importance of counter-reconnaissance must be elevated in our warfighting philosophy. The Ellis Group has taken the lead in developing a tentative manual for counter-reconnaissance which is currently staffing within the Marine Corps Warfighting Laboratory. The Marine Corps must move forward with flushing out this important doctrinal change from an ancillary security task to a specified task with a specified counter-reconnaissance force resourced to execute this critical function in the future operating environment. Third, the Marine Corps must address how we will employ loitering munitions and swarming capabilities. Now is the time to pull the MAGTF team together to develop the big blue arrows for how the Marine Corps will fight with this revolutionary capability in order to drive design changes to the system architecture and doctrinal changes across the MAGTF. Fourth, the Service should address the lack of an overarching Marine Corps reconnaissance doctrine which meets GCE requirements within the context of MAGTF capabilities. Finally, the Service should validate its desires of the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISRE) in order to ensure roles, responsibilities, and capabilities are sufficiently defined to achieve "com-

plementary effects across the physical domains," "information environment," and "electromagnetic spectrum" in support of the MAGTF across the range of military operations and phases of war.¹¹

With regard to the organizational shortfall, based off any doctrinal changes mentioned previously, the Service should review the 2016 Rand Expeditionary Ground Reconnaissance report, the 2017 Counter-Reconnaissance Wargame, and the Future GCE Reconnaissance Wargame outputs while conducting a holistic MAGTF review of how our ISR communities and assets can be better organized to facilitate the management of assets, the collection of combat information, and the distribution of combat information and intelligence that will support MarDiv and regimental commanders' understanding of the complex and expanded future operating environment and facilitate reconnaissance units' aggressive sensing, counter-reconnaissance, and battlespace shaping. As part of this, the Marine Corps should consider the establishment of a reconnaissance regiment under the tasking authority of the MarDiv G-3 that will, in coordination with the G-2 for collections requirements, develop a concept of employment for the MarDiv's ISR assets, manage and task collections efforts, task and resource a dedicated counter-reconnaissance force, coordinate deception operations, and possess the ability to tap into special technical operations, alternate compensatory control measure programs, and special access programs to coordinate their employment in support of the Division's overall scheme of maneuver. The headquarters could function as an enhanced reconnaissance operations center for the MarDiv headquarters and will likely facilitate liaison officer exchanges with the MEF Information Group (MIG). A possible force design of the reconnaissance regiment should include the LAR and reconnaissance battalions as the action arms of the regiment. It should include an intelligence company composed of all the intelligence specialties, like current fusion cells, that is also capable of supporting the LAR and reconnaissance battalions with habitual detachments of human

intelligence, counter-intelligence, and radio reconnaissance Marines. Finally, the reconnaissance regiment should possess an unmanned systems company that, initially, will employ UAS capable of providing the persistent ISR or RSTA coverage desired to support sensing across the division's area of operations, area of influence, and into areas of interest as required. As future unmanned systems are fielded, there is potential for the unmanned system company to control logistic sustainment and casualty evacuation support to the dispersed elements. The implementation of a reconnaissance regiment will not only optimize the full potential of future armored reconnaissance elements, it will provide a necessary fusion of the MarDiv's intelligence, reconnaissance, surveillance, and deep target acquisition capabilities to holistically coordinate, manage, and support the division's scheme of maneuver and fires in support of MAGTF objectives.

With regard to the training pillar singular shortfall identified earlier, the Marine Corps must fix the current lack of formal training for the LAR scout. There is much that is expected of the LAR formation far to the front or flanks of its supported unit and an integral part of the LAR formation is its Scouts. Once a baseline of sufficient standardized entry-level training is established, the Marine Corps should then begin to conduct detailed analysis on the future training, manning, and equipping of LAR scouts based off desired capabilities in accordance with updated doctrine. The scout is a key element within the LAR system that should contribute to defining future ARV base and mission role platform requirements in order to holistically understand and design a future LAR battalion force structure.

While the materiel pillar has several efforts underway that support future armored reconnaissance formations, the following are three materiel recommendations for additional investment. First, the Marine Corps should invest in a persistent ISR capability that is in direct support of the GCE. Recent wargaming and experimentation demonstrated a need for additional long loiter ISR capabilities that directly sup-

port the GCE. In the near future, small UAS platforms will proliferate across the GCE. However, these platforms will be used for situational awareness in relatively close proximity to their supported unit because of their size, payload, range, and endurance. These platforms require a dedicated controller and have a detectable signature that adds risk to force protection. Acknowledging VMUs possess capabilities beyond the SUAS sensors fielded—or to be fielded—to the GCE, the operating range and support requirements of VMU assets limit their ability to support the information requirements of the MAGTF, let alone service all the requests from the GCE. There is also doubt across the Marine Corps as to the availability of Group V UAS to service GCE requirements in the future operating environment based on past operational experiences and implementation results of systems played in recent wargames and simulations. One system—represented in the January 2019 LOCUST simulation experiment, and soon to be evaluated during an Advanced Naval Technical Exercise—possesses long loiter capabilities that can be controlled from a location outside the theater of operation (if desired) but with less on station time, and carry significantly better multi-spectral payloads than currently employed. The capability represented by this system enabled tasking from a toolkit associated with LOCUST, automatic target recognition software, and the ability to see either full motion video or image chips, reducing the adversary's ability to direction find an end user. The use of this type of extended range and duration multi-spectral platform had significant impacts to supporting LAR's deep sensing and affecting capabilities in an expanded battlespace during the execution of the LOCUST simulation experiment.

Second, the LAR, tank, and assault amphibian communities have long possessed fabrication capabilities organic to their structure. This capability within the organic armored reconnaissance formation enables rapid repairs to organic equipment. As additive manufacturing capabilities begin to demonstrate their return on investment, the Marine Corps

should institutionalize the capability at the LAR battalion to produce repair parts such as gaskets, non-ballistic metal parts, brackets, housings, and plastics for expeditionary repairs to UAS and UGV systems. The LAR battalions are already using funds to procure an experimental additive manufacturing capability, but they have limited utility in what they can “print” with the systems they have procured. This is a problem the Marine Corps must address in order to establish a common standard architecture as well as ensure life-cycle sustainment. While the Corps has moved out and published additive manufacturing capability guidance and begun fielding the capability at maintenance battalions, the capability must be pushed further down to support the LAR battalion's ability to self-sustain as it executes its tasks—which are growing in distance from the rest of the MAGTF and supporting combat service support units.

Third, the Marine Corps must invest further in robotic autonomous systems (RAS) that aid armored reconnaissance units' “ability to sense, make sense, and act more rapidly”¹² as well as enable logistic sustainment with a low probability of detection and cyber hardening to prevent adversary interference. Various recent wargames and discussions within HQMC have explored the benefits versus risks of manned and unmanned teaming, as well as the right level of autonomy to facilitate effective and sufficient expeditionary employment in a communications degraded or denied environment. There is potential to off-board certain capabilities such as long haul communications, electronic warfare, electro-optical/infrared sensors, and weapons systems to RAS that can serve as “wingmen” to a host platform.

Off boarding distinct enabling capabilities on an automated platform can reduce the weight and overall dimensions of combat vehicles to ensure transportability and deployability from the future naval force. It can reduce the manning requirements for re-allocation elsewhere within the future force by, “eliminating the requirement for humans to physically operate these vehicles.”¹³ It thereby also reduces the risk to personnel in manned host platforms by

providing them the ability to, “occupy survivable and concealed positions,” with sufficient standoff from danger areas and employ their RAS to investigate, collect, or effect an item or target of interest, “covered by their combat vehicles’ organic weapons platforms.”¹⁴

The Future Reconnaissance Table Top Exercises and Force Valuation Workshop highlighted a desire from the LAR, expeditionary ground reconnaissance, and scout/sniper communities for unmanned systems (autonomous, semi-autonomous, or remotely piloted) to be able to navigate to a contact point with low probability of detection to deliver Classes I (subsistence), III (petroleum, oil, lubricants), V (ammunition), VIII (medical), and IX (repair parts). A stretch goal, but one worthy of experimentation, is the ability to request an unmanned asset (autonomous, semi-autonomous, or remotely piloted) to provide a platform for CASEVAC that is climate controlled, monitors vitals en-route, and provides updates on critically degrading casualties to receiving medical facilities. Recent wargames have demonstrated significant risk to force against near-peer adversaries when the gamers relied on traditional means for resupply and casualty evacuation. Investment in appropriate RAS with signature management and cyber-hardening at the forefront of design, will distribute enabling capabilities, lighten combat vehicles, reduce manpower requirements, enable distributed expeditionary logistics, and enable better protection of “our forces and intentions, denying the enemy the ability to collect, [and] corrupting his assessment.”¹⁵

Finally, the question is how does the Marine Corps maintain the momentum of its campaign of learning? The commonality throughout previous studies, exercises, wargames, and simulations of these important doctrinal, organizational, training, and materiel areas are ripe to harvest for evolution into the future of how we fight as a Marine Corps. One course of action is to draft a series of hypothesis concerning these areas and prioritize a future GCE reconnaissance exercise similar to an Advanced Naval Technical Exercise which evaluates them holistically and explores the technologies that can holistically transform

GCE reconnaissance capabilities and capacities. Detailed analysis on the back end will refine information gaps, set priorities of work and investment, and enable implementation for the Marine Corps reconnaissance to evolve in an efficient and sufficient manner.

Conclusion

In closing, the course the Marine Corps charted to modernize its armored reconnaissance force is focused on the LAR battalion’s platform capabilities. When the ARV is fielded, it will exponentially change how the LAR battalion can support the GCE, and the MAGTF writ large. However, developing the platform is but one part of the system which requires further change to optimize the full utility of the LAR battalions specifically, and GCE reconnaissance assets in general. Gen Robert B. Neller, the 37th Commandant of the Marine Corps, previously observed that,

offered that winning the reconnaissance and counter-reconnaissance fight was paramount to mission success and survivability of the force and the Counter Reconnaissance Wargame X-File adeptly captured the risks associated with status quo.¹⁶

In order to harness the maximum effect of the transformational ARV platform, the Marine Corps should consider the above doctrinal, organizational, training, and materiel recommendations, invest additional resources, and continue to evolve and optimize the armored reconnaissance unit’s ability to supply useful near-realtime combat information and work through enemy reconnaissance and deception efforts in order to shape the operating environment for the supported commander in the future operating environment with a credible combat winning force.

Notes

1. Headquarters Marine Corps, *LOAG [Light Armored Reconnaissance Operational Advisory Group] Campaign Plan*, (Washington, DC: 2018).
2. Ibid.
3. Ibid.

4. Group 2 UAS is representative of capabilities inherent in the RQ-20 Puma. Group 3 UAS is representative of capabilities inherent in the RQ-7 Shadow and RQ-21 Blackjack.

5. Headquarters Marine Corps, *Counter Reconnaissance Concept (Art and Theory of Counter Reconnaissance) Draft*, Marine Corps Warfighting Laboratory, (Quantico, VA: May 2018).

6. Essential elements of friendly information (EEFI) are defined as, “Key questions likely to be asked by adversary officials and intelligence systems about specific friendly intentions, capabilities, and activities, so they can obtain answers critical to their operational effectiveness.” Department of Defense, *Joint Publication 1-02, Dictionary of Military and Associated Terms*, (Washington, DC: November 2010).

7. *Counter-Reconnaissance Concept*.

8. Maj Andrew Price, *Examination of LAR’s “Fight Tonight” Design Strategy*, (Quantico, VA: Command and Staff College, 2018).

9. Col Matthew Jones, “Reconnaissance /Counter-Reconnaissance Task Force: Confronting the Hybrid War,” *Marine Corps Gazette*, (Quantico, VA: February 2017).

10. Ladd W. Shepard, “Light Armored Reconnaissance: Misunderstood and Underemployed in Deep Operations,” (Quantico, VA: Command and Staff College, 2010).

11. Headquarters Marine Corps, *Marine Corps Intelligence Reconnaissance Surveillance Enterprise* draft concept (as cited in, Department of Defense, *Dictionary of Military and Associated Terms*, (Washington, DC: February 2018).

12. LtCols Sean Barnes, and Ladd Shepard, “Manned and Unmanned Teaming in Future Reconnaissance Units,” *Marine Corps Gazette*, (Quantico, VA: May 2018).

13. LtCol Johnathan Kinitz, “To Win in the Mega-City: What the Marine Corps Must Understand to Achieve Mounted Mobility in the Mega-City,” (Quantico, VA: Command and Staff College, 2016).

14. Ibid.

15. “Manned and Unmanned Teaming in Future Reconnaissance Units.”

16. United States Marine Corps, *Reconnaissance/Counter Reconnaissance Wargame X-File*, Marine Corps Warfighting Laboratory, (Quantico, VA: October 2017).

