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**THESIS**

**DETERMINING THE LEVEL OF THREAT IRAN POSES  
TO OIL OUTPUT IN THE GULF REGION**

by

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December 2020

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THE GULF REGION**

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requirements for the degree of

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## **ABSTRACT**

With its abundant oil resources and as largest producer of oil in the world, the Arabian Gulf region is of crucial importance to the world. And, oil output from the region has been under threat from Iran since that country's revolution in 1979. Using academic research as well as available reports from expert panels, government agencies, and media, this thesis examines the level of threat Iran poses to the Gulf oil industry in view of Iran's key military capabilities, including its naval and air capabilities, which could be used to disrupt Arabian Gulf oil production and shipping. This thesis focuses on case studies of specific incidents in which Iran has used these capabilities for similar ends in past attacks, including the 2019 sabotage attacks on civilian ships near Al Fujairah and the Gulf of Oman, and the combined cruise missile and drone attack on Saudi Arabia's Shaybah and Aramco Abqaiq facilities. These case studies help establish how Iran can use its military capabilities against its neighbors and other adversaries in potential future attacks related to regional oil production and transport. Moreover, the analysis assesses the extent of the damage from such attacks, the constraints Iran faces in orchestrating its attacks, and the likelihood that it will attempt to take such action in the future.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Attack Cruise Missile
ASBM	Anti-Ship Ballistic Missile
ASCM	Anti-Ship Cruise Missile
C4ISR	Command, Control, Communication, Computer, Intelligence, Surveillance, and Reconnaissance
CENTCOM	US Central Command
CRBM	Close Range Ballistic Missile
CRS	Congressional Research Service
ENA	Emirates News Agency
GCC	Gulf Cooperation Council
ICBM	Intercontinental Ballistic Missiles
IRGC	Islamic Revolutionary Guard Corps
IRGCAF	Islamic Revolution Guard Corps Aerospace Force
IRGCCF	Islamic Revolution Guard Corps Ground Force
IRGCN	Islamic Revolution Guard Corps Navy
IRGCQF	Islamic Revolution Guard Corps Quds Force
IRIA	Islamic Republic of Iran Army
IRIADF	Islamic Republic of Iran Air Defense Force
IRIAF	Islamic Republic of Iran Air Force
IRIN	Islamic Republic of Iran Navy
LACM	Land Attack Cruise Missile
MRBM	Medium Range Ballistic Missiles
MRL	Multi Rocket Launcher
NASIC	National Air and Space Intelligence Center
NGL	Natural Gas Liquids
PRG	Rocket Propelled Grenade Launcher
RCS	Radar Cross Section
RIB	Rigid Hulled Inflatable Boats

SDV	Swimmer Delivery Vehicle
SLOC	Sea Lines of Communication
SOH	Strait of Hormuz
SRBM	Short Range Ballistic Missile
SSM	Surface to Surface Missile
TEL	Transporter Erector Launchers
UAV	Unmanned Air Vehicle
USV	Unmanned Surface Vehicle
UUV	Unmanned Underwater Vehicle

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# I. INTRODUCTION

## A. MAJOR RESEARCH QUESTION

Does Iran threaten the Arabian Gulf oil output? This thesis explores that issue by first examining Iran's key military capabilities, particularly its air and naval capabilities that could be used to threaten Arabian Gulf oil production and shipping. This thesis then explores case studies wherein Iran has used these capabilities toward similar ends in past attacks, including the 2019 sabotage attacks on civilian ships near Fujairah and the Gulf of Oman, and the combined cruise missile and drone attack on Saudi Arabia's Shaybah and Aramco Abqaiq facilities. These case studies help establish how Iran can use its military capabilities against its neighbors and perceived adversaries in any potential future attacks related to regional oil production and transport.

## B. SIGNIFICANCE OF THE RESEARCH QUESTION

The Arabian Gulf is a very crucial oil region and is home to the largest oil producers, such as Saudi Arabia, Kuwait, the United Arab Emirates, Bahrain, and Qatar, who export oil to the rest of the world. In the Gulf Cooperation Countries (GCC) region, several oil factories and platforms export oil through the Strait of Hormuz (SOH). In fact, an estimated 21 million barrels, which is equal to 21% of global petroleum liquids consumption, transit the passage every day.<sup>1</sup> In addition, the Gulf region is significant to the United States' economy. In January 1980, President Jimmy Carter informed Congress that access to the Arabian Gulf's oilfields was essential to the health of the U.S. economy.<sup>2</sup> This policy, which was called "The Carter Doctrine," emphasized the importance of the Gulf's oil to the U.S. economy. To illustrate this importance, during the Iranian revolution in 1979, the U.S. sent a rapid deployment force to the Arabian Gulf to protect the oil supply from any further threat from the revolution. Iranian hostilities

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<sup>1</sup> EIA, "The Strait of Hormuz Is the World's Most Important Oil Transit Chokepoint," U.S. Energy Information Administration, June 20, 2019, <https://www.eia.gov/todayinenergy/detail.php?id=39932>.

<sup>2</sup> Michael T. Klare, "Oil, Iraq, and American Foreign Policy: The Continuing Salience of the Carter Doctrine," *International Journal: Canada's Journal of Global Policy Analysis* 62, no. 1 (March 2007): 32, <https://journals-sagepub-com.libproxy.nps.edu/doi/pdf/10.1177/002070200706200104>.

toward the Gulf region even increased after the revolution. During the Tanker War (1981–1988), “some 441 ships had been hit during the Iran-Iraq conflict,”<sup>3</sup> and 168 of them were targeted by Iran.<sup>4</sup> Recently, a few commercial vessels have also been attacked by Iran, such as the motor tanker *Altair* and motor tanker *Kokua Courageous*, which were hit in the Oman Gulf area on June 13, 2019. Moreover, Iran is accused for the attack on the Aramco oil installation on September 14, 2019. The hostile activities by Iran and its proxies in the region threaten the economy of the Gulf states in particular and the international community in general. The international community in general and GCC states particularly should take Iran’s enmity toward the global economy seriously and prevent any threat to the SOH.

### C. LITERATURE REVIEW

This review evaluates the literature examining the severity of the Iranian threat to the Gulf’s oil output. With the rise of the industrial sector around the world in the past several decades, the Gulf region became a critical oil producer and exporter. The recent hostile Iranian rhetoric and enmity directed at the Gulf oil installations and transportation have prompted many writers to debate this issue. Most of the literature discusses the Iranian capability and willingness to threaten Gulf oil production. Yet, the level of Iran’s threat to the oil domain and the impact of such a threat on oil producers in the Gulf area are still unclear. Contributors to this literature address a few of these questions, such what Iran’s ability to threaten oil output in the Gulf is, which military capabilities Iran can exploit to menace this crucial region, and whether that threat will succeed or not.

In his book, *Tanker War*, Lee Zatarain examines the Iranian weapon systems used during Iran-Iraq War, and he mentions that Iran deployed Silk-worm, a Chinese version of an old Russian Styx anti-ship missile, not only against Iraq but also in the SOH. He said that “the Silk-worm gave Iran the realistic potential to sink large tankers for the first

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<sup>3</sup> Lee Zatarain, *Tanker War : America’s First Conflict with Iran* (Philadelphia: Casemate, 2008), 386.

<sup>4</sup> Ronald O’Rourke, “The Tanker War,” in *Proceedings of the U.S. Naval Institute*(Annapolis, MD: U.S. Naval Institute, 1988), <https://www.usni.org/magazines/proceedings/1998/may> .

time, putting teeth into its threat to close the Gulf.”<sup>5</sup> During the war, Iran attacked many oil tankers bearing a GCC or U.S. flag in the Gulf region. The Iranian threat to Gulf oil compelled European nations, such as the Great Britain, Germany, the Netherlands, Belgium, and Italy, to join the minesweeping forces in the Gulf region.<sup>6</sup>

Several historical events in the SOH area demonstrate Iran’s tactics against the shipping in the region. For instance, during the Tanker War amid the Iran-Iraq War, Iran laid many sea mines in the Arabian Gulf. According to an analysis report from the U.S. Air War College, “168 ships were attacked by Iran from the period from 1981 to 1987”.<sup>7</sup> During that war, Iran employed its mine and short-range rocket capabilities to attack motor vessels in the Gulf area.

Joshua R. Itzkowitz Shifrinson and Miranda Priebe’s article “A Crude Threat: The Limits of an Iranian Missile Campaign against Saudi Arabian Oil” examines the Iranian ballistic missile threats to the oil installations in the Arabian Gulf region in general and in Saudi Arabia specifically. They offer an answer to the main question about whether Iran could use its ballistic missile arsenal to significantly reduce Saudi Arabia’s oil production. According to the writers, Iran could not significantly reduce Saudi oil exports due to limited Iranian capabilities versus Saudi infrastructure redundancies.<sup>8</sup> The authors state that successfully attacking oil installations in the Gulf area, however, “would have many of the same effects as a blockade of the Strait of Hormuz”.<sup>9</sup> Additionally, the writers suggest that an Iranian response for an attack on its nuclear facilities by launching

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<sup>5</sup> Zatarain, *Tanker War*, 34.

<sup>6</sup> Zatarain, 94 .

<sup>7</sup> Maedh A. Al-Lihaibi, “An Analysis of the Iran-Iraq War: Military Strategy and Political Objectives” (Montgomery, AL: Air War College, May 1989), 23, <https://apps.dtic.mil/dtic/tr/fulltext/u2/a217255.pdf>.

<sup>8</sup> Joshua R. Itzkowitz Shifrinson and Miranda Priebe, “A Crude Threat: The Limits of an Iranian Missile Campaign against Saudi Arabian Oil,” *International Security* 36, no. 1 (July 1, 2011): 170, [https://doi.org/10.1162/ISEC\\_a\\_00048](https://doi.org/10.1162/ISEC_a_00048).

<sup>9</sup> Shifrinson and Priebe, “A Crude Threat,” 170.

missile attacks on oil installations in the Gulf region “should not be a significant concern for policymakers.”<sup>10</sup>

Shifrinson and Priebe state that Iran would likely attack a high-value target in Saudi Arabia’s oil industry. For instance, Iran would not target the oil wells nor oil pipelines. Rather, Iran would target the Saudi stabilization facilities, where dangerous hydrogen sulfide is removed from the oil, or oil export stations such as ports. The reason for targeting stabilization plants, such as Abqaiq, is that it would restrict Saudi Arabia from safely producing the oil safe for export.<sup>11</sup> In addition, stabilization stations would take a longer time to repair.<sup>12</sup> Stabilization stations are an important part of the oil network. Abqaiq stabilization plant, for example, is one of the most important oil facilities, with a capacity to process 13 million barrels of oil daily (mb/d).<sup>13</sup> The station processes two-thirds of all Saudi oil (6.1 mb/d).<sup>14</sup> Furthermore, Shifrinson and Priebe discuss the missiles, such as short-range Shahab-1 and Fateh A-110 ballistic missiles, that Iran most likely would use to threaten Saudi oil installations. Although Iran possesses missiles with ranges able to reach the Gulf oil installations, these weapons are unlikely, according to the article, to cause significant damage due to the limited number in Iran’s missile arsenal,<sup>15</sup> and due to the Saudi’s ability to rapidly repair any malfunction in the oil facilities.

The writers concluded the article with a judgment that Iran is not posing a significant threat to Saudi and Gulf oil flow because of the low numbers and poor quality of its missile stock. Nevertheless, the Iranian-missile threat to Gulf oil output could disrupt the oil flow even if a missile misses the target and causes no physical damage to

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<sup>10</sup> Shifrinson and Priebe, 170.

<sup>11</sup> Shifrinson and Priebe, 177.

<sup>12</sup> Shifrinson and Priebe, 178.

<sup>13</sup> Shifrinson and Priebe, 174.

<sup>14</sup> Shifrinson and Priebe, 174.

<sup>15</sup> Shifrinson and Priebe, 192.

the oil installations.<sup>16</sup> The missed-target missile attack would have a psychological impact that would “sow panic on the market”.<sup>17</sup>

Caitlin Talmadge, on the other hand, in her article “Closing Time: Assessing the Iranian Threat to the Strait of Hormuz” discusses the maritime capabilities Iran could use to harass naval vessels transiting the passageway. She explores the various ways Iran could use its military capabilities to close the Strait of Hormuz. In her article, she states that Iran may close the SOH by laying at least 2,000 sea mines in different parts of the Strait using multiple platforms such as frigates, corvettes, fast boats, helicopters, or submarines to deliver those mines. Although mines have low hit probabilities, they derive much of their power, as Talmadge explains, “from the fear they induce.”<sup>18</sup> The other scenario is to use an anti-ship cruise missile fired from a speed boat, helicopter, or land base. The purpose of Iran’s use of anti-ship missiles in this scenario would be to attack U.S. naval ships and other motor vessels, especially oil tankers, in the vicinity of the Strait. Iran’s main goal in such an attack is to gain political advantages. In addition, Talmadge discusses the Iranian deployment of sea mines such as the M-08 North Korean-manufactured moored contact mine, the similar M-26 sea mine, and the powerful MDM-6 mine, as well as the C-802 Saccade, CSS-N-2 Silkworm, and CSS-N-3 Seersucker anti-ship cruise missiles.<sup>19</sup>

The Iranian dependence on the SOH may reduce the likelihood of a total closure of the passageway. An analyst from the Institute of Near East and Gulf Military Analysis, INEGMA, Sabahat Khan, argues that approximately 87 percent of Iranian exports and around 99 percent of its oil exports are by sea, and accordingly, Iran would be impacted

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<sup>16</sup> Shifrinson and Priebe, 200.

<sup>17</sup> Amos Yadlin and Yoel Guzansky, “The Strait of Hormuz: Assessing and Neutralizing the Threat,” *Strategic Assessment* 14, no. 4 (January 2012): 13, [https://www.inss.org.il/wp-content/uploads/sites/2/systemfiles/\(FILE\)1329719640.pdf](https://www.inss.org.il/wp-content/uploads/sites/2/systemfiles/(FILE)1329719640.pdf).

<sup>18</sup> Caitlin Talmadge, “Closing Time , Assessing the Iranian Threat to the Strait of Hormuz,” *International Security* 33, no. 1 (Summer 2008): 91, <https://doi.org/10.1162/isec.2008.33.1.82>.

<sup>19</sup> Talmadge, “Closing Time,” 101.

by blocking the strait even more than other countries in the region.<sup>20</sup> Yet, many analysts argue that total closure of the SOH “would be attempted as an absolute final resort of Iran.”<sup>21</sup>

A report from the Congressional Research Service (CRS) titled *Iran’s Threats, the Strait of Hormuz, and Oil Markets* argues that due to its dependence on trade through the Strait, “Iran may be unlikely to attempt to close the waterway, but rather to shape the international debate on Iran policy.”<sup>22</sup> In addition, the report discusses Iran’s options for leveraging the Strait. Moreover, the report emphasizes Iran’s vital need for the passageway due to its export and import of oil and other goods. Accordingly, the report discounts the likelihood of a total closure of the channel. The report mentions three Iranian options for the SOH starting from a total closure, which is regarded as a low probability event. The second option is harassment and infrastructure damage, which is similar to the Iran-Iraq conflict in the 1980s. This option, according to the report, also is unlikely to occur since it may alienate Iran’s remaining oil customers. The third option is to continue threatening the strait by conducting naval exercises close to the shipping lanes to disturb the ship’s movement and to raise tensions in the area. Moreover, the report states that even harassment, without total closure, would contribute to reducing the export of oil from the region, which would lead to increased oil prices. Besides, the report suggests that a complete block of the SOH “would likely contribute to higher global oil prices.”<sup>23</sup> Accordingly, this practice may risk triggering a military conflict with Iran.<sup>24</sup> The question is how severe these attacks and practices are to the SOH region and what are the probable impacts globally of such campaigns. The majority of the literature

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<sup>20</sup> Sabahat Khan, “Iranian Mining of the Strait of Hormuz – Plausibility and Key Considerations,” *Institute of Near East and Gulf Military Analysis (INEGMA)*, (January 2010): 1, <http://www.inegma.com/admin/content/file-29122013113155.pdf>.

<sup>21</sup> Khan, “Iranian Mining of the Strait of Hormuz ,” 1.

<sup>22</sup> Michael Ratner, *Iran’s Threats, the Strait of Hormuz, and Oil Markets: In Brief*, CRS Report No. R45281 (Washington, D.C.: Congressional Research Service, August 6, 2018), 4, <https://crsreports.congress.gov/product/pdf/R/R45281>.

<sup>23</sup> Ratner, *Iran’s Threats, the Strait of Hormuz, and Oil Markets: In Brief*, 4.

<sup>24</sup> Ratner, 5.

discusses the Iranian capability and tactics either to threaten the oil installations in the Gulf region using ballistic missiles or sea mines to close the SOH or to harass ships' movements in the vicinity of the passageway zone center by using mine warfare or short-range anti-ship cruise missiles.

Much of the literature discusses the Iranian threat to GCC oil production since it is regarded as one of the most critical regions in the world. Although most of the literature discusses Iranian intentions toward the Gulf area and whether Iran would succeed, this literature did not examine the severity and impact of such potential actions. In addition, most of the literature disregarded the Iranian options to exploit cheap and reliable technology, such as drone technology, to pose a threat to oil installations and oil tanker movement in the Gulf region. Iranian drones have already been used in various military capacities by Iran's proxies in Yemen, Syria, and Lebanon. Consequently, this thesis also evaluates the likelihood that Iran will use a drone system to threaten Gulf oil facilities and considers the potential results from such attacks.

#### **D. POTENTIAL EXPLANATIONS AND HYPOTHESES**

There are three hypotheses to address the main question regarding how great a threat Iran poses to Gulf oil output, which are 1) Iran poses a low threat; 2) Iran poses a moderate threat; or 3) Iran poses a high threat. According to the literature reviewed, the most probable answer is that Iran poses a moderate threat to Gulf oil production. Although Iran possesses cruise missiles, mines, and drone weapon systems, it avoids using them against oil installations in the Gulf area. Iran realizes the risk of direct confrontation with Saudi Arabia and other GCC states. Yet, Iran might exploit its proxies in the GCC area to pose a threat to the region's oil infrastructure. In the worst-case scenario, if Iran used its missile arsenal and drones to attack Gulf oil installations and shipping in the Gulf and SOH areas, it would pose a moderate threat to Gulf oil output. This hypothesis is based on several factors. First, Iran's short supply and the poor performance of its missile and munitions stock make it unable to seriously threaten the Gulf oil sector. Second, Iran fully recognizes the risk of direct confrontation with the oil producer countries in the Gulf region. Any threat to the Gulf area is a threat to the global

source of oil. As a result, the international community would be affected by Iran's threats to the Gulf region. Third, the GCC has rapid response capability and sophisticated systems to mitigate any loss of or damage to its oil network. Fourth, the existence of anti-missile defense close to oil installations in the Gulf region would diminish the Iranian threat to these vital spots. Nevertheless, Iran's threat to oil platforms and oil tankers in Gulf region using its missiles, mines, and drones, even if it did not cause much physical damage, would disrupt the flow of oil and the oil market. Accordingly, Iran poses a moderate threat to Gulf oil output.

Furthermore, Iran itself is highly dependent on SOH for its exports, including oil. The recent U.S. sanctions, which have tremendously reduced Iran's dependence on the Strait of Hormuz, however, have increased the probability of Iran attempting a full closure of the SOH. Yet, Iran realizes the significance of the strait to the Gulf region and the international community, and that realization may cause Iran to avoid direct confrontation with the great powers and the Gulf states. Besides, Iran's threats to the SOH may cost it allies and customers.<sup>25</sup> The United States has regarded the strait and Gulf oil production as vital to the health of the nation's economy. On July 27, 2018, then U.S. Defense Secretary James N. Mattis replied to an inquiry regarding Iran's likelihood of closing the SOH, saying: "Clearly, this [closure] would be an attack on international shipping and could have an international response to reopen the shipping lanes ... because the world's economy depends on those energy supplies flowing out of there."<sup>26</sup> Yet, Iran's threatening the SOH, even only verbally only, could impact shipping within the strait and consequently could disrupt Gulf oil production. So, Iran poses a moderate threat to Gulf oil output.

## **E. RESEARCH DESIGN**

The thesis examines a combination of case studies, reports of analyses, articles, and books. The cases studied in this paper are the recent Saudi, Emirates', and

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<sup>25</sup> Ratner, 4.

<sup>26</sup> Terri Moon, "Communications Key in Solving International Disputes, Mattis Says," (Washington, D.C.: Department of Defense, July 27, 2018), <https://www.defense.gov/Explore/News/Article/Article/1586793/communications-key-in-solving-international-disputes/>.



Norwegian motor vessel incidents near Al Fujairah in the United Arab Emirates, the sabotage attack on Japanese and Norwegian ships in the Gulf of Oman, the Shaybah oilfield incident, and the Abqaiq and Khurais attacks. These case studies provide a helpful source for clearer assessment. They also illustrate the enemy's course of action, capabilities, and weaknesses. Another thoughtful resource contributing to this thesis are analysis reports issued by trusted institutions such as the U.S. Congress and well-known news agencies and schools. The significance of these reports is that some of them contain useful intelligence information that may support the main claim. Additionally, articles from news agencies are also useful references that may contain strong arguments. Although the previously discussed literature provided useful background information, the majority of these sources are not up to date. Moreover, some of the arguments in these sources have proved wrong. The Iranian military capabilities have changed, for example, and therefore its tactics and targeting probability have changed, too. The thesis uses updated sources, such as recent CRS reports, articles, research from think tanks, official websites, and the latest sources available. Moreover, Janes is also a useful source for information on Iran's missile, drones, and maritime capabilities.

## **F. CHAPTER OUTLINE**

The research paper is divided into four main chapters. The first chapter has introduced the research question and hypotheses and presented a review of the relevant literature. Chapter II provides an overview of Iranian capabilities such as submarines, corvettes, small boats, mine warfare, missiles, and drone systems that Iran may use to attack oil facilities in the Gulf region. Chapter III looks at whether Iran is willing to use its capabilities to challenge the oil production in GCC states. This examination relies on recent case studies such as Iran's attacks on oil tankers near Al Fujairah port in the United Arab Emirates and Gulf of Oman, and attacks on Shaybah and Abqaiq oil facilities in Saudi Arabia. The final chapter evaluates the overall threat that Iran poses to oil output in the Gulf region.

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## II. IRAN'S CAPABILITIES AND MILITARY MODERNIZATION

To analyze the Iranian threat to Gulf oil output, it is essential to understand Iran's capabilities that could be used to threaten the regional oil infrastructure and shipping. In recent years, Iran has made great efforts to improve its military forces, modernize its existing weapons, and manufacture a variety of weapons such as small arms, mines, and missiles. Yet, its declining economy and U.S. sanctions have left Iran with limited resources and access to technology, leading the country to prioritize the development of weapon systems over other assets such as aircraft. For instance, Iran designated a large budget for missile technology, including ballistic and cruise missile systems in addition to radar and air defense systems, to deter potential aggression. In addition, U.S. sanctions impelled the nation to produce weapons through its local arms industries.

Iran's defense budget in recent years has ranged between 10 and 15 billion U.S. dollars per year.<sup>27</sup> After the revolution in 1979, Iran divided its armed forces into two military forces. One is the regular military (Artesh), which is responsible to defend the nation from any external threat. The other is the Islamic Revolutionary Guard Corps (IRGC), which has the broader responsibility to protect the revolution inside the country, and export it outside. The regular Iranian Armed Forces and the IRGC both report to the Supreme Leader of Iran through a Joint Staff Headquarters. The total number of military personnel, not including internal security forces, is 525,000 personnel.<sup>28</sup> And, as just mentioned, Iran's military has numerous capabilities that the nation could use to threaten the Gulf's oil output. This chapter describes the composition of Iran's forces including its proxies within the region. Additionally, the discussion offers how Iran distributes its military and what capabilities those forces have that Iran would most likely use to target the oil infrastructure in the area.

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<sup>27</sup> Kenneth Katzman, *Iran's Foreign and Defense Policies*, CRS Report No. R44017 (Washington, D.C.: Congressional Research Service, April 29, 2020), 15, <https://crsreports.congress.gov/product/pdf/R/R44017>.

<sup>28</sup> Katzman, *Iran's Foreign and Defense Policies*, 15.

## A. IRAN'S FORCE COMPOSITION

The Artesh is the regular Iranian forces that consist of four branches, the Islamic Republic of Iran Army (IRIA), the Islamic Republic of Iran Navy (IRIN), the Islamic Republic of Iran Air Force (IRIAF), and the Islamic Republic of Iran Air Defense Force (IRIADF). The IRIA is composed of 350,000 active personnel distributed among nine armored brigades, four mechanized infantry brigades, 21 infantry brigades, one airborne brigade, one special forces brigade, and five artillery regiments.<sup>29</sup> The IRIA's main units are concentrated in the northern, western, and southwestern areas of the nation, and their main mission is to protect the country's territory.

The IRIN is the nation's regular navy, which includes 18,000 active-duty sailors.<sup>30</sup> The IRIN is responsible for the Caspian Sea, Gulf of Oman, and Arabian Sea. Moreover, IRIN's main duty is to maintain the security of Iran's territorial waters, defending Iranian ports and protecting Iran's flagged merchant ships from piracy, in addition to safeguarding sea lines of communications (SLOC). Besides, the IRIN is responsible for counter-smuggling and protecting against illegal immigration and fishing within the nation's territorial waters. Furthermore, the IRIN operates most of the Iranian submarines, frigates, and missile boats.

The IRIAF is the regular national air force, composed of 50,000 active personnel. The IRIAF is responsible for patrolling the nation's airspace and protecting the state from external aggression. Furthermore, one of the IRIAF's roles is to conduct long-range strike missions in case of hostile action, with support from ballistic and cruise missile strikes. Nevertheless, the IRIAF is very limited in its resources and its reach due to decades-old platforms and limited access to the foreign air technology market.<sup>31</sup> Therefore, the IRIAF is unable to effectively protect the nation's airspace against enemies that have air superiority. In terms of its distribution, the IRIAF has three regional areas of

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<sup>29</sup> "Iran - Army," Jane's, April 28, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWARA171-GULF>.

<sup>30</sup> Talmadge, "Closing Time," 86.

<sup>31</sup> "Iran - Airforce," Jane's, July 19, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWAF127-GULF>.

responsibilities, which are the Western Area Command (WAC), the Southern Area Command (SAC), and the Eastern Area Command (EAC).

In addition to and separate from the IRIAF is the IRIADF, which was established in 2008 as a new service. It is independent not only of the regular national air force but also separate from the army and navy. The IRIADF is responsible for Iranian air defense capabilities by managing Iran's regional air defense zone through the main headquarters.<sup>32</sup>

The IRGC, on the other hand, is the Iranian revolutionary force that focuses on protecting the revolution and achieving the strategic objectives of Iran. The IRGC force provides support to Iranian's proxies in the GCC region. The services it provides include training, technical support, and munitions supply. The IRGC also oversees Iran's role in foreign conflict zones such as in Iraq and Yemen. Similar to the Artesh, the IRGC is also divided into the Islamic Revolution Guard Corps Ground Force (IRGCGF), the Islamic Revolution Guard Corps Navy (IRGCN), the Islamic Revolutionary Guard Corps Aerospace Force (IRGCAF), Quds Force, and Basij.

The IRGCGF consists of 100,000 active personnel distributed among 31 provincial corps.<sup>33</sup> The IRGCGF is responsible to maintain the security inside the country. Composed of 20,000 active-duty sailors, is the IRGCN operates in the Arabian Gulf and SOH. The IRGCN is responsible for significant naval operations in addition to anti-U.S. operations in the Gulf area.<sup>34</sup> On the other side, the IRGCAF is responsible to operate Iran's missile systems in addition to the country's Unmanned Air Vehicles (UAV). The IRGCAF also operates a few aircraft and helicopters such as the Russian Su-22, the Falcon 20E fighters, and the EMB 312, and the AH-1J attacking helicopters..<sup>35</sup>

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<sup>32</sup> Jane's.

<sup>33</sup> "Islamic Revolution Guard Corps Ground Force - Army," Jane's, August 6, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWARA339-JWAR>.

<sup>34</sup> Jane's, "Islamic Revolution Guard Corps Ground Force - Army."

<sup>35</sup> "Islamic Revolution Guard Corps Aerospace Force - Air Force," Jane's, August 7, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWAF440-JWAF>.

The IRGCAF, however, still has very limited air capabilities since Iran is relying on its IRIAF to protect its airspace.

The IRGC also supports the Quds force (IRGCQF) and has provided them with multiple types of rockets, missiles, and munitions. The IRGCQF is the special operations force division of the IRGC. Moreover, it is in charge of all foreign deployments and activities. In addition, the IRGC Quds Force trains and supports internal volunteer militias and external clients and proxies in order to facilitate the nation's strategic objectives and support the country in case of strikes from regional enemies. For example, internally, the IRGC commands the Basij Force, which is a volunteer force. Basij is one of the largest enterprises in Iran, encompassing over 15 million members.<sup>36</sup> Externally, the IRGC supports and commands the Hizballah organization in Lebanon and some other GCC countries. Furthermore, the IRGC supports and guides the Houthi insurgents in Yemen and al Quds Forces in Iraq. Iran supports and directs these militias to threaten GCC interests in the region, including oil output. To avoid direct confrontation with regional countries, Iran will likely use indirect attacks on the GCC and regional countries' oil output in the future through its proxies and clients within the region. The Shiite insurgents in the GCC states are another significant tool that the IRGC exploits to threaten the oil production of GCC states.

The Houthi insurgents in Yemen are one of Iran's abroad clients. Iran is providing the Houthis group with various kinds of support such as training, munitions, and financial support. The most significant support Iran has provided to the Houthi rebels has been the transfer of ballistic missile technology and the training to effectively use those weapons. According to a Congressional Research Service report, Iran provided Houthis with "military support in the form of assault rifles, rocket-propelled grenade launchers, anti-tank guided missiles, and more sophisticated cruise missile systems. Some of those weapons have technical characteristics similar to arms manufactured in the Islamic

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<sup>36</sup> Afshon Ostovar, *Vanguard of the Imam: Religion, Politics, and Iran's Revolutionary Guards* (New York, NY: Oxford University Press, 2016), 5.

Republic of Iran.”<sup>37</sup> Iran supports the Houthi insurgents in Yemen with such weapons to threaten oil installations in the Gulf states. For instance, Houthi militias took credit for the UAV attacks against the Saudi oil fields in Abqaiq and Khurais in September 2019. Nevertheless, evidence showed that the attack could not have originated from Yemen.<sup>38</sup> Indeed, Houthi rebels are constantly targeting the GCC countries following Iranian directions.

Additionally, Iran supports other rebels groups in the region, such as Al Ashtar Brigade in Bahrain, with training and munitions to threaten oil infrastructures. Through the IRGCQF, Iran could indirectly attack the Gulf oil output and critical sites. For instance, On November 10, 2017, a terrorist attack took place on Bahrain’s pipelines that deliver crude oil from Saudi Arabia to Bahrain. The explosion was most likely conducted by the pro-Iranian group despite Iran’s denial of the incident.<sup>39</sup>

Thus, the forces that Iran is most likely to use to target GCC oil output are the IRGCN, the IRGCNQF, and the Houthi groups in Yemen. Among these groups, the IRGCN, which represents Iran’s naval forces, is mainly responsible for the Gulf waters and the SOH. With its assets distributed along Iran’s coast, the IRGCN is more likely to threaten the oil facilities in this region than the regular navy. The IRGCNQF and Houthis are militias supported and trained by Iran. These groups achieve Iran’s goals through their repeated covert attacks on GCC states. Moreover, Quds and Houthi forces perform their tasks separately from Iran, making the latter clear of charges in any attack.

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<sup>37</sup> Jeremy M. Sharp, *Yemen: Civil War and Regional Intervention*, CRS Report No. R43960 (Washington, D.C.: Congressional Research Service, April 23, 2020), 8, <https://crsreports.congress.gov/product/pdf/R/R43960>.

<sup>38</sup> Farzin Nadimi, “The UN Exposes Houthi Reliance on Iranian Weapons,” *Policy Watch* 3261 (Washington, DC: The Washington Institute, February 13, 2020), <https://www.washingtoninstitute.org/policy-analysis/view/the-un-exposes-houthi-reliance-on-iranian-weapons>.

<sup>39</sup> Simon Henderson, *Bahrain Pipeline Explosion Seen as a Warning from Iran*, (Washington, D.C.: The Washington Institute, November 14, 2017), <https://www.washingtoninstitute.org/policy-analysis/view/bahrain-pipeline-explosion-seen-as-a-warning-from-iran>.

## B. IRANIAN BASES

Iran has numerous air and naval bases distributed throughout the nation's land and the Arabian Gulf coastal line and islands (see Figure 1). Several locations are used by the nation's army, air force, and the IRIN in addition to the IRGC. The Iranian bases house the nation's military platforms, personnel, and munitions, and these bases may be used to launch strikes against GCC oil infrastructures. In this regard, some of Iran's bases present a greater threat to the Gulf's oil production than other locations.



Figure 1. Iran's Naval Bases<sup>40</sup>

For instance, Iran established several bases along its coastline that are maintained by the IRIN, the IRIAF, and the IRGC for their surface units, aircraft, and munitions. The bases, which include Assalouyeh, Basatin, Nokhaylo, Halileh, Nay Band, Dayyer, Bandar

<sup>40</sup> Adapted from Nations Online, "Map of the Persian Gulf, Middle East," accessed October 18, 2020. <https://www.nationsonline.org/oneworld/map/Persian-Gulf-Map.htm>.



Shenas, and Bandar Lengeh, bases pose a lower threat to the GCC states due to the long distances between these islands and the Gulf's oil facilities.

In addition, the Bander Bushehr base also presents a reduced threat to GCC oil output because the base is located close to Bushehr nuclear station, which is regarded as a critical Iranian site. Therefore, Iran would seek to protect this site rather than use it as an attack point. Furthermore, the base contains the first IRIN region HQ as well as the first marine brigade.<sup>41</sup> The site is also being used by the IRGCN second regional HQ<sup>42</sup> and hosts an airbase that belongs to the IRAF. According to a Janes' report, Iran installed a permanent S-300PMU2 long-range air defense system at this site,<sup>43</sup> but it is most likely that Iran equipped the base with air defense missiles to protect the country's significant nuclear facilities. Therefore, there is less potential that Iran may use this base as an attack point.

On the other hand, Iran has established the Bandar Mahshahr naval base close to the Iraqi territory, which may pose a medium threat to the region's oil infrastructures due to its proximity to Iraq and Kuwait. The base is also a station for the IRGC's third naval regional HQ.<sup>44</sup>

Posing a greater threat are several islands occupied by Iran that are within closer distances to the Gulf's sea and land oil platforms. These islands include Al Farsiyah (Farsi), Abu Musa, Sirri, Lavan, Lesser Tunb, Greater Tunb, Larak, Kish, Kharg, and Forur, and they are utilized by the IRIN, IRGC, and the IRIAF.<sup>45</sup> Additionally, the

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<sup>41</sup> "Iran - Navy," Jane's, August 7, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWNA0072-GULF>.

<sup>42</sup> "Islamic Revolution Guards Corps Navy - Navy," Jane's, August 7, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWNA0229-JWNA>.

<sup>43</sup> "Iran Deploys S-300 to Bushehr," Jane's, July 13, 2017, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG\\_554217-JDW](https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG_554217-JDW).

<sup>44</sup> Jane's, "Islamic Revolution Guards Corps Navy - Navy."

<sup>45</sup> Anthony H. Cordesman and Aaron Lin, *The Iranian Sea-Air-Missile Threat to Gulf Shipping* (Washington, D.C.: Center for Strategic & International Studies, February 2015), 13, [https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy\\_files/files/publication/150219\\_Cordesman\\_IranAirSeaMissileThreat\\_Web.pdf](https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/150219_Cordesman_IranAirSeaMissileThreat_Web.pdf).

Islands are not only prepared with naval facilities for hosting naval ships and boats but also with runways for air assets. In particular, Al Farsiyyah, Abu Musa, and Serri islands represent a higher potential menace to Gulf oil output due to their proximity to the GCC's oil installations in addition to the facilities fitted on these islands. Moreover, Greater Tunb Island could pose an even greater threat to merchant ships entering the Gulf sea due to its very close proximity to the SOH.

Another location of increased threat is Qeshm Island, which represents Iran's largest island. The island is located very close to the Strait of Hormuz, which adds to the island's value. Qeshm Island is used by the IRGC to station their vessels and midget submarines in addition to a 1,600-meter-long runway, which could indicate Iran's intention to operate larger UAVs such as the Shahad 129, according to the Jane's report.<sup>46</sup> Additionally, the island is being used for UAV development as revealed by satellite imagery.<sup>47</sup> The location could also be used as a further deployment for anti-ship missile systems, as well as a starting point for any offensive operations against shipping within the SOH region.

Moreover, one of Iran's most threatening sites is the Bandar Abbas base in the Southern Gulf close to the SOH. The base is occupied by the IRIN's second naval regional HQ and the second marine brigade.<sup>48</sup> In addition, the location is an important spot for the IRGCN, which is exploiting it as a base for its first naval regional HQ in addition to its naval aviation command and three squadrons.<sup>49</sup> The IRGC has also stationed many of its naval assets such as midget submarines, corvettes, small boats, and unmanned underwater vehicles (UUV) in the Bandar Abbas base. The site also contains an airport used by the IRAF, and the location is fitted with a missile system operated by

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<sup>46</sup> "Satellite Imagery Reveals Iranian UAV Base Developments," Jane's, August 22, 2013, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/jdw53056-jdw-2013>.

<sup>47</sup> Jane's, "Satellite Imagery Reveals Iranian UAV Base Developments."

<sup>48</sup> Jane's, "Iran - Navy."

<sup>49</sup> Jane's, "Islamic Revolution Guards Corps Navy - Navy."

the IRGCAF.<sup>50</sup> According to a Jane's report, most Iranian naval assets are concentrated at Bandar Abbas and Jask Island.<sup>51</sup>

Iran is using a strategy based on force distribution among several locations to distract its enemies and also to make it more difficult to target the nation's force, which is scattered across a vast area and many locations. In addition, Iran could use the commercial and private ports and jetties as temporary sites and attack points for its naval and UAV units. Moreover, Iranian missiles could be positioned in any spot along the coastline.

### **C. IRANIAN CAPABILITIES**

Iran has naval and air units in addition to short, medium, and long range cruise and ballistic missile systems that could be used for an attack on oil output in the Gulf states. Iran also possess a large inventory of sea mines in addition to unmanned systems. Each unit and weapon is discussed in the following sections.

#### **1. Submarines**

Submarines are considered a strategic weapon for Iran due to their ability to launch cruise missiles, torpedoes, and sea mines. Moreover, Iranian submarines can be used for surveillance and information-gathering for longer-range missions. In addition, submarines could be used for mine laying activities.

Iran has different types of submarines with different sizes and missions. The Iranian navy operates three 877 Kilo-class type submarines, the Tareq, Noor, and Yunes. The 877 Kilo-class submarine is a Russian-made submarine.<sup>52</sup> The first one was commissioned on November 21, 1992. The submarine is 72.6 meters in length and has a maximum speed of 17 knots.<sup>53</sup> It is fitted with six 533 mm torpedo tubes that can carry

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<sup>50</sup> Jane's, "Islamic Revolution Guard Corps Aerospace Force - Air Force."

<sup>51</sup> Jane's, "Iran - Navy."

<sup>52</sup> "Kilo Class (Project 877EKM)," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1517-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1517-jfs_).

<sup>53</sup> Jane's, "Kilo Class (Project 877EKM),"

different types of torpedoes including the Test-71 anti-submarine torpedo that reaches up to a range of 23 kilometers with a maximum speed of 35 knots, and the 53–65 anti-surface torpedo, which has a maximum range of 19 kilometers and a maximum speed of 45 knots.<sup>54</sup> In addition, the submarine may carry 24 sea mines in lieu of torpedoes. The 877 Kilo-class submarines are stationed at Bander Abbas naval base. In addition to its primary mission, the submarines could be used for mine laying as a secondary role.<sup>55</sup> According to a Jane's report, the Tareq began being refitted in mid-2005 and re-launched in September 2012; it became operational in 2013. The Noor may not be operational in the meantime as it is expected to start being refitted, while the Yunes has undergone several maintenance periods in recent years in order to keep it operational.<sup>56</sup>

The Ghadir (IS 120) is another submarine class that the Iranian navy operates. IRIN has 20 Ghadir class submarines.<sup>57</sup> The submarine is a modified North Korean Yono class midget submarine with an overall length of 29 meters and a maximum speed of 10 knots.<sup>58</sup> The submarine is equipped with two 533 mm tubes and capable to carry Surface to Surface Missiles (SSM).<sup>59</sup> The IS 20 submarines are based at Bander Abbas naval base. The Ghadir class is capable of maneuvering in a shallow depth area such as the Arabian Gulf and the Strait of Hormuz. According to an intelligence report, on February 24, 2019, a Ghadir-type submarine fired an anti-ship missile using its torpedo tube.<sup>60</sup> The missile seems to be a modified C-704 developed under the Jack-2 program. Additionally, the Ghadir class midget could be employed for mine laying operations, and it could be used to attack merchant shipping within the Arabian Gulf and SOH region due to its

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<sup>54</sup> Jane's.

<sup>55</sup> Khan, "Iranian Mining of the Strait of Hormuz – Plausibility and Key Considerations," 4.

<sup>56</sup> Jane's, "Kilo Class (Project 877EKM)."

<sup>57</sup> "Ghadir (IS 120) Class," Jane's, January 1, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_5992-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_5992-jfs_).

<sup>58</sup> Jane's, "Ghadir (IS 120) Class."

<sup>59</sup> Jane's.

<sup>60</sup> Jane's.

small size and ability to maneuver in the shallow water combined with its capability to launch a variety of munitions like SSM, torpedoes, and sea mines.<sup>61</sup>

Furthermore, the Iran navy has one operational Fateh class submarine in addition to two submarines under construction.<sup>62</sup> The Fateh submarine is 48 meters in length and very similar to the Sang-O class North Korean submarine of a larger size. The submarine is fitted with four 533 mm torpedo tubes that can be used for mines instead of the torpedoes.<sup>63</sup> Additionally, the submarine is capable to dive up to 200 meters below the sea surface for almost five weeks.<sup>64</sup> At Iran's Seventh Scientific Command and Control Conference in Tehran on December 10, 2013, Brigadier General Hossein Dehqan stated that "the testing of the operation of the first model of the submarine was successfully completed and Fateh will be delivered to the naval forces of the Islamic Revolution Guards Corps (IRGC) after it is adequately equipped and armed."<sup>65</sup>

Moreover, the IRIN operates one Nahang class midget submarine with an overall length of 25 meters.<sup>66</sup> A Jane's report claims that the Iranian navy is probably building two more of this class of midget submarine.<sup>67</sup> The submarine is built with a smaller size to operate in shallow waters for the purposes of laying mines and as a mothership for swimmer delivery vehicles.

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<sup>61</sup> Jane's.

<sup>62</sup> "Fateh Class," Jane's, March 13, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_b994-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_b994-jfs_).

<sup>63</sup> Jane's, "Fateh Class."

<sup>64</sup> "Fateh (Conqueror / Victor) 'Semi-Heavy' Submarine," Global Security, <https://www.globalsecurity.org/military/world/iran/fateh.htm>.

<sup>65</sup> Global Security, 'Fateh Semi-Heavy' Submarine."

<sup>66</sup> "Nahang Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a753-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a753-jfs_).

<sup>67</sup> Jane's, "Nahang Class."

## 2. Frigates

The IRIN frigates are mainly used in deep water areas such as the Gulf of Oman and Gulf of Aden. The main missions of the Iranian frigates are to conduct patrolling operations and represent the country in multi-national exercises. They also can be used for special operations like anti-smuggling and anti-piracy operations. For instance, the IRIN ship Alborz deployed to the Gulf of Aden to conduct anti-piracy operations in mid-2009 according to a Jane's report.<sup>68</sup> However, since the frigates are exploited to protect the nation's territorial waters, they are less likely to be deployed to attack the Gulf's oil infrastructure.

Iran possesses two different types of frigates, the Mowj and the Alvand. These Iranian frigates are operated and maintained by the IRIN as surface combatants, and they have been improved with modern, locally made systems. The IRIN frigates often conduct patrols in the open waters in the Gulf of Oman region and participate in multi-national exercises with neighboring countries such as India and North Korea. Iran has two operational Mowj in addition to five under construction.<sup>69</sup> Iran also has three operational Alvand class frigates.<sup>70</sup>

The Mowj class frigate is an Iranian-made platform constructed at the IRIN's yard at Bander Abbas. The IRIN operates two ships of this class and is building five more. The operational vessels are the Jamaran and the Shahand, while Iran is constructing the Damavand, the Shiraz, and three others, according to a Jane's report.<sup>71</sup> The Mowj class frigate is 94.5 meters in length and 11 meters overall beam. Additionally, the ship has 1,372 tonnes full-load displacement and its maximum speed is 28 knots.<sup>72</sup> The frigate is fitted with four Noor (C-802) or Ghader (C-802A) Anti Surface Missiles and four

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<sup>68</sup> "Alvand (Vosper Mk 5) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1520-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1520-jfs_).

<sup>69</sup> "Jamaran (Mowj) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_c065-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_c065-jfs_).

<sup>70</sup> Jane's, "Alvand (Vosper Mk 5) Class."

<sup>71</sup> Jane's, "Jamaran (Mowj) Class."

<sup>72</sup> Jane's.

Standard SM-1 Block V Surface-to-Air missiles. Moreover, the vessel is armed with six 324 mm MK-32 torpedo tubes. The ship is also fitted with one 76 mm gun along with either one 40 mm or one Kamand 30 mm gun. Additionally, the ship is equipped with one 20 mm and two 12.7 machine guns. The ship also has a flight deck, which makes it capable of carrying helicopters.<sup>73</sup>

The other frigate class the IRIN operates is the Alvand class frigate. Alvand class frigates were delivered from the U.K. navy in 1960, and they were renamed after the revolution in 1979.<sup>74</sup> The IRIN has three frigates of this class, the Alvand, the Alborz, and the Sabalan, whilst the fourth one was sunk in 1988 after a military engagement with the U.S. Navy. The IRIN updated the Alvand type frigates to keep them in service. The ship is 94.5 meters in total length and 11 meters beam.<sup>75</sup> The full load displacement of the vessel is 1,372 tonnes and its maximum speed is 39 knots. The ship is armed with four Noor (C-802) or Ghader (C-802A) Surface-to-Surface Missiles in addition to six 324 mm MK-32 torpedo tubes. Furthermore, the ship is fitted with one Vickers MK-8 114 mm, two Oerlikon 35 mm, and one Kaman 30 mm guns.<sup>76</sup> Additionally, this frigate type is equipped with two Oerlikon GAM-BO1 20 mm and two 12.7 mm machine guns. Fitted also with Graseby 174 active search and Graseby 170 active attack hull-mounted sonars, this vessel is an Anti-Submarine Warfare (ASW) capable ship.<sup>77</sup>

### **3. Corvette and Fast Attack Crafts**

Besides submarines and frigates, Iran has different sizes and types of missile boats that can be used for various operations such as patrolling, missile launching, mine laying, and harassment. The Iranian corvette fleet presents a higher threat to the GCC oil infrastructures due to their superior maneuverability, which enhances hit-and-run tactics

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<sup>73</sup> Jane's.

<sup>74</sup> Jane's, "Alvand (Vosper Mk 5) Class."

<sup>75</sup> Jane's.

<sup>76</sup> Jane's.

<sup>77</sup> Jane's.

and shortens the time required to perform tasks. Moreover, the corvettes are fitted with a variety of weapons, making them a more critical threat. Iran possesses several fast attack crafts run by the IRIN and the IRGCN. For instance, Iran has two Bayandor-class corvettes that were transferred from the United States to Iran under the Mutual Assistance program in 1964, the Bayandor, which was commissioned in 2009, and the Naghdi, which commissioned in 2012.<sup>78</sup> Each boat is 84 meters in length and has a maximum speed of 20 knots. The weapons fitted onboard the corvettes are four Noor (C-802) or Ghader (C-802A) missiles, one 76 mm Oto Melara gun, and six 324 mm MK 32 torpedo tubes.<sup>79</sup> Moreover, air and surface radars are fitted onboard in addition to a sonar system to provide the boat with underwater capability, but these systems may have been removed.<sup>80</sup>

IRIN also operates 14 French-made Kaman class fast attack missile boats and has four more under construction.<sup>81</sup> The boat is 47 meters in length with a maximum speed of 37 knots. The Kaman class boat is fitted with one 76 mm Oto Melara gun and one Breda 40 mm Gun, and some of this class have a 23 mm or 20 mm machine gun in place of the 40 mm gun.<sup>82</sup> In addition, most of the Kaman class boats carry four Noor (C-802) missiles. The Kaman class is the IRIN's main platform for anti-ship missile delivery.<sup>83</sup> The boat also can be deployed for mine laying operations due to its high maneuverability and speed. IRIN also operates four Sina fast attack craft, which is the Iranian-made version of the Kaman fast attack missile boat.<sup>84</sup> According to a recent Jane's report,

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<sup>78</sup> "Bayandor (PF 103) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1521-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1521-jfs_).

<sup>79</sup> Jane's, "Bayandor (PF 103) Class."

<sup>80</sup> Jane's.

<sup>81</sup> "Kaman (Combattante II) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1529-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1529-jfs_).

<sup>82</sup> Jane's, "Kaman (Combattante II) Class."

<sup>83</sup> Talmadge, "Closing Time," 110.

<sup>84</sup> Jane's, "Kaman (Combattante II) Class."



another four Sina class boats are under construction, “including at least in the Caspian and two at Bandar Abbas.”<sup>85</sup>

Furthermore, Iran has ten operational Chinese Houdong (Thondor) class fast attack missile boats that are operated by the IRGCN.<sup>86</sup> The boat has an overall length of 38.6 meters and a maximum speed of 35 knots. The unit is fitted with four SSM launchers that are capable to carry either the Noor (C-802) or the Ghader (C-802A).<sup>87</sup> In addition, the boat has two AK-230 30 mm guns and two 23 mm machine guns. The boat is used primarily as a platform for delivering an anti-ship missile.<sup>88</sup>

#### **4. Small Boats**

Among the its surface fleet, Iran has various types of small attack boats. The majority of them are operated by the IRGCN. Small boats offer several advantages such as their low cost and high production rate. They are also difficult to detect by radars, a feature complemented by their very high speeds and superior maneuverability. Moreover, the majority of the Iran’s small boats are fitted with short-range rockets and mines. Additionally, some of the IRGC’s boats are able to operate below water, which gives them the advantage of surprise when carrying out surface attacks. Indeed, a small boat force is a crucial Iranian tool for targeting the Gulf’s oil installations and tankers.

The IRGCN, for instance, operates nine C14 class attack boats.<sup>89</sup> This boat is 13.65 meters in length and reaches a speed of 50 knots. Although the boat is small, it can be fitted with four Nasr-1 (C-740) SSMs in addition to one 20 mm, one 12.7 mm, and one

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<sup>85</sup> Jane’s.

<sup>86</sup> “Thondor (Houdong) Class,” Jane’s, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1530-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1530-jfs_).

<sup>87</sup> Jane’s, “Thondor (Houdong) Class.”

<sup>88</sup> Talmadge, “Closing Time.” 110.

<sup>89</sup> “C 14 Class,” Jane’s, March 13, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_4610-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_4610-jfs_).

12-barreled 122 mm machine gun.<sup>90</sup> Four of these boats are a little longer (13.75 m) and fitted with a BM-21 122 mm Multi Rocket Launcher (MRL) and operated by the IRIN.<sup>91</sup>

The IRGCN also operates ten Chinese-made MK-13 patrol craft.<sup>92</sup> The boat is 13.5 meters in length and has a maximum speed of 60 knots. It is fitted with two Nasr-1 (C-740) SSMs in addition to two 324 mm tubes used to launch anti-ship torpedoes.<sup>93</sup> This kind of small boat could be used for night mine-laying activities, relying on its approximate capacity to carry three mines per boat.<sup>94</sup>

The IRGCN, in addition, operates 15 units of the Peykaap I coastal patrol craft, which is built in North Korea.<sup>95</sup> The boat has an overall length of 17 meters and a maximum speed of 52 knots. The craft is fitted with two 324 mm torpedoes and one 12.7 mm machine gun.<sup>96</sup> The torpedoes fitted onboard are most likely intended for disabling ships missions. Moreover, Iran has the Peykaap II, which is the slightly larger version of the Peykaap I and probably built by Iran. The boat's total length is 17.3 meters and maximum speed is 52 knots.<sup>97</sup> There are 25 Peykaap II in service and they are run by the IRGCN.<sup>98</sup> The Peykaap II craft are armed with two missile launchers for Kowsar (C-701) or Nasr-1 (C-704) missiles in addition to torpedoes.<sup>99</sup> The IRGC also runs six operational Peykaap III coastal patrol crafts that are similar to the Peykaap II boats in size

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<sup>90</sup> Jane's, "C 14 Class."

<sup>91</sup> Jane's.

<sup>92</sup> "Mk 13 Patrol Craft," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a754-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a754-jfs_).

<sup>93</sup> Jane's.

<sup>94</sup> Talmadge, "Closing Time," 92.

<sup>95</sup> "Peykaap I (IPS 16) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_5643-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_5643-jfs_).

<sup>96</sup> Jane's, "Peykaap I (IPS 16) Class."

<sup>97</sup> "Peykaap II (IPS 16 Mod) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a916-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a916-jfs_).

<sup>98</sup> Jane's, "Peykaap II (IPS 16 Mod) Class."

<sup>99</sup> Jane's.

and speed, but they are fitted with two 12.7 mm machine guns instead of the torpedoes.<sup>100</sup>

Moreover, Iran has ten operational Tir (IPS 18) class coastal patrol crafts, which are made by the North Koreans and run by the IRGCN. The Tir class boats are 21 meters in length and can reach a speed of 52 knots. Each unit is fitted with one 12.7 mm machine gun and two 533 mm torpedoes. The boats are deployed for anti-surface ship missions.

The IRGCN also operates 15 in-service Tarlan class inshore patrol boats made with an aluminum catamaran hull that is most likely a modification of a commercial boat.<sup>101</sup> The craft is almost 12 meters in length and maneuvers at a speed of 50 knots. According to a Jane's report, the boat has a 1.5 meters high pedestal located in the forward part, which is probably used as a support for a wire/laser-guided weapon similar to an anti-tank guided missile (ATGM).<sup>102</sup> The boat's role is not certain but it is more likely to serve as an anti-surface ship.

In addition, Iran builds and operates 15 Kashdom class inshore patrol boats that are most likely run by the IRGCN.<sup>103</sup> The Kashdom class vessel is 16 meters in length and has a maximum speed of 45 knots.<sup>104</sup> The boat is fitted with one 23 mm and one 12.7 mm machine gun. In addition, an MRL may also fit in the boat's cabin.<sup>105</sup> The craft is probably a modification of the C14 class boats. A developed version of this type of craft known as the Kashdom III and IV comes with a missile launcher, but the number of these boats is unknown.

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<sup>100</sup> "Peykaap III (IPS 16 Mod) Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_b405-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_b405-jfs_).

<sup>101</sup> "Tarlan Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a555-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a555-jfs_).

<sup>102</sup> Jane's, "Tarlan Class."

<sup>103</sup> "Kashdom Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a917-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a917-jfs_).

<sup>104</sup> Jane's, "Kashdom Class."

<sup>105</sup> Jane's.

Another fast patrol craft that Iran possesses is the Pashe (MIG-G-1900) class inshore patrol boat operated by the IRGC.<sup>106</sup> There are ten of this class in service, and Iran is most likely to buy a local version of the U.S. MK II boat with some modifications.<sup>107</sup> The boat is almost 20 meters in length and runs at speeds up to 36 knots. The boat is fitted with a surface radar and two 23 mm machine guns.<sup>108</sup> The IRGC also runs 30 boats of the Murcia (MIG-G-0900) class inshore patrol craft.<sup>109</sup> The boat is 9.2 meters in length and reaches a top speed of 30 knots.<sup>110</sup> The boat carries one 12-barreled 107 mm MRL in addition to three 12.7 mm machine guns and one RPG-7 rocket launcher or 106 mm recoilless rifle instead of the RPG-7.<sup>111</sup>

Additionally, the IRGC operates ten Ghaem (MIG-S-1800) class inshore patrol craft assembled in Iran for patrolling missions.<sup>112</sup> The boat is 18.7 meters in length and its top speed is 18 knots.<sup>113</sup> The vessel is fitted with one Oerlikon 20 mm and two 7.62 mm machine guns.<sup>114</sup> The IRGCN also operates an estimated number of 100 Ashoora I inshore boats, which are locally made based on the U.S. Boston Whaler type craft design.<sup>115</sup> The boat is 6.7 meters in total length and has a top speed of 40 knots.<sup>116</sup> The craft is most likely to be used for mine laying missions. Some of these types of boats are

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<sup>106</sup> “Pashe (MIG-G-1900) Class,” Jane’s, March 13, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1535-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1535-jfs_).

<sup>107</sup> Jane’s, “Pashe (MIG-G-1900) Class.”

<sup>108</sup> Jane’s.

<sup>109</sup> “Murce (MIG-G-0900) Class,” Jane’s, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_5521-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_5521-jfs_).

<sup>110</sup> Jane’s, “Murce (MIG-G-0900) Class.”

<sup>111</sup> Jane’s.

<sup>112</sup> “Ghaem (MIG-S-1800) Class,” Jane’s, March 13, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1533-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1533-jfs_).

<sup>113</sup> Jane’s, “Ghaem (MIG-S-1800) Class.”

<sup>114</sup> Jane’s.

<sup>115</sup> “Ashoora I (MIG-G-0800) Class,” Jane’s, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1539-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1539-jfs_).

<sup>116</sup> Jane’s, “Ashoora I (MIG-G-0800) Class.”

operated by the IRIN. Furthermore, Iran has approximately 20 Boghammar crafts, which are operated by the IRGCN and the IRIN.<sup>117</sup> This type of boat has an overall length of 13 meters and a maximum speed of 46 knots. The craft is fitted with one RPG-7 rocket launcher or a 106 mm recoilless rifle instead.<sup>118</sup> The boat also carries one 12 barreled 107 mm rocket launcher. The unit is stationed in Bander Abbas base and can be transported by larger ships to be deployed in another location such as the Farsi, Sirri, and Abu Musa islands.<sup>119</sup> The boat was refitted in 1991 with new engines.<sup>120</sup> According to a Jane's report, there are approximately ten similar boats known as Torah that have an overall length of 11 meters and are run by the IRGCN and the IRIN.<sup>121</sup>

One of the unique boats that Iran has is the North Korean-made Kajami class semi-submersible craft, also known as Zolfaqar.<sup>122</sup> The IRGC has three of these submersible boats in service.<sup>123</sup> The boat has an overall length of 16.8 meters and a top speed of 40 knots. The vessel is fitted with two 324 mm torpedoes.<sup>124</sup> The boat is most likely to operate in a concept of high-speed surface approach to the target, followed by a submerged phase in up to three meters' depth, before it attacks the target through a snort mast. The unit's main mission is anti-surface ship attacks due to its hiding capability.

Another submergible boat the IRGCN operates is the Gahjae class semi-submersible craft. The IRGCN has three in-service boats of this class that have an overall

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<sup>117</sup> "Boghammar Craft," Jane's, March 13, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_1538-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_1538-jfs_).

<sup>118</sup> Jane's, "Boghammar Craft."

<sup>119</sup> Jane's.

<sup>120</sup> Jane's.

<sup>121</sup> Jane's.

<sup>122</sup> "Kajami Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a554-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a554-jfs_).

<sup>123</sup> Jane's, "Kajami Class."

<sup>124</sup> Jane's.

length of 17 meters and a top speed of 40 knots.<sup>125</sup> The boat is a stealthy design that produces a small Radar Cross Section (RCS), making it difficult for radars to detect. Each boat is fitted with two 324 mm torpedoes.<sup>126</sup>

Moreover, Iran possesses many other small speed boats and Rigid Hulled Inflatable Boats (RIB) in addition to civilian fishing boats of different sizes and types that could support multiple activities, such as intercepting surface units, mine laying, attacking surface ships, delivering divers, and many other missions. Additionally, these boats could be fitted with rockets, Rocket Propelled Grenade Launchers (RPG), machine guns, small munitions, and surveillance equipment.

## **5. Mine Warfare**

Iran's mine inventory is considered as a crucial weapon for Iran to threaten the GCC oil tankers in the Gulf region. Iran depends heavily on mines in its naval strategy due to this option's low cost versus the powerful damage they can cause. Mines can be laid by various kinds of platforms including submarines, surface units, small boats, and even civilian boats and fishing dhows. Moreover, mines are small, easy to produce, and require almost no maintenance. Consequently, mine warfare is an important element in Iran's naval strategy especially after the Iran-Iraq conflict in 1988. Since the Tanker war, the IRIN and the IRGCN have rapidly improved their mine warfare capability by modifying their naval platforms to become mine-laying capable platforms. In addition, both navies have improved their inventory of sea mines. Iran possesses an estimated 5,000 mines.<sup>127</sup> Although the country is capable to manufacture mines, its advanced stock of sea mines is imported from other countries such as Russia, China, and North Korea. Iran depends on its mine inventory to attack an advanced enemy. As Lee Zatarain recounted in his book on the Tanker war, the U.S. Senate Armed Services Committee report of June 29, 1987, noted that mines were a form of indirect attack that Iran might

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<sup>125</sup> "Gahjae Class," Jane's, March 15, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs\\_a553-jfs\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/jfs_a553-jfs_).

<sup>126</sup> Jane's, "Gahjae Class."

<sup>127</sup> Khan, "Iranian Mining of the Strait of Hormuz," 4.

favor.<sup>128</sup> Recent incidents, such as the Al-Fujairah motor vessel attacks, illustrate Iranian tactics that use sea mines to threaten Iran's enemies.

Iran has different types of sea mines that could be used to attack surface and subsurface enemy platforms. Floating mines could threaten the fixed infrastructure in the Gulf area as well such as oil platforms and oil rigs. One mine that Iran possesses is the limpet mine. The limpet mine is a type of mine that is stuck to the hull of a vessel with a strong magnet. The mine is manually attached to the hull by divers in a covert mission and it detonates either mechanically or by time delay technique. The IRGCN and the IRIN special forces use limpet mines to attack merchant ships in the region. Moreover, Iran possesses the Russian manufactured MDM-6 bottom mine. The MDM-6 mine detonates within a radius of 50 to 60 meters in response to acoustic, magnetic, or pressure influences.<sup>129</sup> In addition, the MDM-6 is a sophisticated sea mine that has an operating depth of approximately 12 to 120 meters.<sup>130</sup> The mine comes with a 1,100 kg warhead and can be laid by the 533 mm torpedo tubes, or from surface units such as frigates, corvette, and small boats. Iran also has Chinese-made EM-52 rocket-propelled mines fitted with an acoustic fuse that operate at a depth of 4.8 to 183 meters.<sup>131</sup> The mine is a 300 kg warhead and it is guided in its rocket ascent phase. Considered one of the most powerful mines, it could penetrate the keel of a U.S. aircraft carrier, according to some experts.<sup>132</sup>

Additionally, Iran has the M-08 moored contact mine, which is considered an old, unsmart mine. Although the M-08 is a World War I-era, unsophisticated mine, it can

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<sup>128</sup> Zatarain, *Tanker War : America's First Conflict with Iran*, 73.

<sup>129</sup> Talmadge, "Closing Time," 92.

<sup>130</sup> Cordesman and Lin, "The Iranian Sea-Air-Missile Threat to Gulf Shipping," 108.

<sup>131</sup> Cordesman and Lin.

<sup>132</sup> Richard Fisher, *China's Military Modernization: Building for Regional and Global Reach* (Westport, CT: Praeger, 2008), 166.

cause significant damage to surface and subsurface units. Iran's mine arsenal also includes the Chinese MC-52, EM-55, EM-31, and EM-11 sea mines.<sup>133</sup>

Recently, Iran launched its first indigenous Swimmer Delivery Vehicle (SDV). The craft is eight meters in length and can carry three divers in addition to 14 limpet mines. The platform is used by the IRGC and special forces for mine-laying operations within the coastal area. This craft could be carried by a mother ship, such as the Hengam class landing ship (LSL), for the open sea and further deployment. Moreover, the IRIN and the IRGCN use a deception technique to distract the enemy from detecting a mine. For example, they disguise mines as tree branches, shipping boxes, or trash.<sup>134</sup>

Although mines are easy to detect by sonar systems fitted onboard air, surface, and subsurface units, Iran relies on its inventory of mines to threaten shipping within the Gulf region. Sea mines are a potential weapon that Iran may use to attack oil tankers in the Arabian Gulf area. Several instances, such as the attacks on merchant ships near Al Fujairah in the United Arab Emirates (UAE) on May 12, 2019, reveal that Iran uses mines to sabotage motor vessels in the Gulf. Their low cost combined with their high detonation power makes sea mines one of the most likely weapons that Iran may exploit to threaten GCC oil shipping.

## **6. Missiles and Torpedoes**

Iran follows an asymmetric warfare pattern due to the limited capability of the nation as compared to its enemies, including the United States. Therefore, Iran is relying on its cruise and ballistic missiles arsenal, in addition to its inventory of torpedoes. Most of the locally manufactured missiles are derived from China and Russia made missile technology. There has also been a good deal of development and refinement in the Iranian missile program. Iran's missiles are a primary component of the nation's deterrent strategy. According to a Congressional Research Service report, the intelligence community has said that Iran "can strike targets up to 2,000 kilometers from Iran's

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<sup>133</sup> Cordesman and Lin, "The Iranian Sea-Air-Missile Threat to Gulf Shipping," 108.

<sup>134</sup> Cordesman and Lin, 25.



borders.”<sup>135</sup> In addition, Iran could use its missile power to blackmail the GCC states, exploiting their weakness in missile defense, to achieve some goals such as raising oil prices, cutting oil production, or restraining their cooperation with the United States. Accordingly, the United States is supporting the GCC countries with anti-missile systems to address the Iranian missile threat.<sup>136</sup>

Iran possesses different missiles of various types and ranges that include Close Range Ballistic Missiles (CRBM), Short-Range Ballistic Missiles (SRBMs), and Medium Range Ballistic Missiles (MRBM).<sup>137</sup> Although “Iran is not known to possess Intercontinental Ballistic Missiles (ICBMs),” which can travel up to 5,500 kilometers,<sup>138</sup> U.S. officials have argued that Iran is working on a Space Launch Vehicle (SLV) to shorten the timeline to an ICBM.

The CRBMs and the SRBMs have a maximum range of fewer than 500 kilometers, while the MRBMs are capable of reaching up to an approximate distance of 2,000 kilometers.<sup>139</sup> Yet, the majority of the Iran’s missiles are SRBMs used for tactical missions.<sup>140</sup> In addition, Iran has developed a Land Attack Cruise Missile (LACM), which differs from the ballistic missile in some features like low altitude flying profile and multi-direction target attack capability.<sup>141</sup> Furthermore, Iran has developed Anti-

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<sup>135</sup> Stephen M. McCall, *Iran’s Ballistic Missile and Space Launch Programs*, CRS Insight Report No. IF10938 (Washington, D.C.: Congressional Research Service, January 9, 2020), 1, <https://crsreports.congress.gov/product/pdf/IF/IF10938>.

<sup>136</sup> Steven A. Hildreth, *Iran’s Ballistic Missile and Space Launch Programs*, CRS Report No. R42849 (Washington, D.C.: Congressional Research Service, December 6, 2012), 3, <https://crsreports.congress.gov/product/pdf/R/R42849>.

<sup>137</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance* (Washington, D.C.: U.S. Government Publishing Office, 2019), 30, [https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Iran\\_Military\\_Power\\_LR.pdf](https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Iran_Military_Power_LR.pdf).

<sup>138</sup> McCall, *Iran’s Ballistic Missile and Space Launch Programs*, 2.

<sup>139</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 44, 30.

<sup>140</sup> McCall, *Iran’s Ballistic Missile and Space Launch Programs*, 2.

<sup>141</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 30.

Ship Cruise Missiles (ASCM), which are fitted on its frigates, corvettes, and fast attack boats. Iran also manufactures the Anti-Ship Ballistic Missiles (ASBM) that are installed on IRIN submarines.

Iran's SRBMs comprise the majority of the artillery missiles used for short tactical ranges. Iran has about 100 reusable transporter-erector launchers (TEL), which are used to carry and launch this type of missile.<sup>142</sup> Iran's SRBM includes the Shahab-1 (Scud B) and Shahab-2 (Scud C) missiles. The Shahab-1 has a range of approximately 300 kilometers, while the Shahab-2 has an estimated range of 500 kilometers due to its lighter warhead.<sup>143</sup> These missiles are capable to reach most of the Gulf oil installations. Although no accurate information is available about how many of these types of missiles Iran possesses, it is estimated that the country has 400 Shahab-1 and 450 Shahab-2 missiles.<sup>144</sup> Moreover, Iran produces the Qiam missile, which is based on Shahab-2 and has an improved range of between 500 and 1,000 kilometers.<sup>145</sup> In addition, Iran manufactures the Qiam-1 SRBM operated by the IRGC's Aerospace Force.<sup>146</sup> According to an Iranian official, the Qiam missile is hard to detect by enemy anti-missile systems compared to previous missiles.<sup>147</sup> In addition, Iran is using the Fateh-110 family of missiles that includes the Khalij Fars, Hormuz 1, Hormuz 2, and Zolfaghar. The difference between the different types of Fateh-110 missiles is their terminal seeker technologies.<sup>148</sup> The missiles have ranges of approximately 300 kilometers.<sup>149</sup> After an making additional improvements to the Fateh-110 missiles group, Iran unveiled the

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<sup>142</sup> McCall, *Iran's Ballistic Missile and Space Launch Programs*, 1.

<sup>143</sup> Hildreth, *Iran's Ballistic Missile and Space Launch Programs*, 17.

<sup>144</sup> Shiffrinson and Priebe, "A Crude Threat: The Limits of an Iranian Missile Campaign against Saudi Arabian Oil," 183.

<sup>145</sup> McCall, *Iran's Ballistic Missile and Space Launch Programs*, 17.

<sup>146</sup> McCall.

<sup>147</sup> McCall.

<sup>148</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 45.

<sup>149</sup> McCall, *Iran's Ballistic Missile and Space Launch Programs*, 1.

Zolfaghar missile in September 2016. The missile has a range of 700 kilometers, according to Tehran.<sup>150</sup> Furthermore, Iran developed the Fateh-313, with an estimated range of 500 kilometers.<sup>151</sup> Iran often test-fires the SRBM during military exercises. The country is also using them for real operations such as attacking enemies within the region. According to a Congressional Research Service report, on January 7, 2020, Iran launched 16 SRBMs that were fired from different locations inside the country and attacked “two Iraqi military installations housing U.S. troops, Al Asad Airbase and an airbase near Erbil in Northern Iraq.”<sup>152</sup>

Additionally, Iran produces MRBMs capable of hitting targets up to 2,000 kilometers away.<sup>153</sup> According to the National Air and Space Intelligence Center (NASIC), Iran probably has less than 50 MRBM launchers.<sup>154</sup> The MRBMs Iran has developed include the Shahab-3, which is imported from North Korea and has a range of 800 to 1,000 kilometers.<sup>155</sup> Although the missile can travel for long distances, it is not very accurate. Therefore, Iran has developed the missile by making various modification types such as the Sajil, Ashoura, Emad, Ghadr, and Khorramshahr, all of which have extended ranges, better accuracy, and more lethality.<sup>156</sup> The Sajil missile is a modification of the Shahab-3 with an improved range of 2,000 kilometers.<sup>157</sup> This MRBM was first launched in 2007 under the name of Ashoura, which was subsequently changed to Sajil after unsuccessful tests.<sup>158</sup> Moreover, Iran developed the Shahab-3 to

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<sup>150</sup> “Iran Displays Zolfaghar Missile,” Jane’s, December 20, 2017, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG\\_705279-JDW](https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG_705279-JDW).

<sup>151</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 45.

<sup>152</sup> McCall, *Iran’s Ballistic Missile and Space Launch Programs*, 1.

<sup>153</sup> McCall.

<sup>154</sup> McCall.

<sup>155</sup> McCall.

<sup>156</sup> Katzman, *Iran’s Foreign and Defense Policies*, 11.

<sup>157</sup> McCall, *Iran’s Ballistic Missile and Space Launch Programs*, 2.

<sup>158</sup> McCall.

MRBM Ghadr-1 which reaches an extended distance and carry a smaller payload. In March 2016, Iran tested the MRBM Emad-1, which is a modified version of Ghadr-1. The Emad-1 appears to be a Ghadr-1 with Reentry Vehicle (RV) modification with longer range.<sup>159</sup> In addition, it has an improved range of 2,000 kilometers with more probability to hit the target.<sup>160</sup>

Iran has also developed Land Attack Cruise Missiles (LACM) capable of flying at low altitudes, which makes them difficult for radar to detect, and they can hit a target from different directions.<sup>161</sup> In 2012, Iran announced its first LACM, the Meshkat, and in 2015, Iran revealed its Soumar missile that has a range of 2,000 kilometers.<sup>162</sup> In addition, Iran carried out the successful firing test of the Hoveizeh LACM, which reached a range of 1,200 kilometers and precisely hit its target.<sup>163</sup> The Hoveizeh is a modification of the Soumar missile. Iran has also modified the Soumar missile to create newer versions, including the Qods-1 and the Ya Ali. According to a Congressional Research Service report, Iran used Qods-1 and Ya Ali missiles to attack the Saudi critical energy infrastructure in Abqaiq on September 14, 2019.”<sup>164</sup>

Additionally, Iran produces ASCMs based on Chinese-made C700 series and C802 missiles.<sup>165</sup> For instance, Iran developed the Chinese C802 to create an Iranian

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<sup>159</sup> McCall.

<sup>160</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 45.

<sup>161</sup> “Ballistic and Cruise Missile Threat 2017” (Wright-Patterson AFB, OH: National Air and Space Intelligence Center, June 30, 2017), 35, [https://www.nasic.af.mil/Portals/19/images/Fact%20Sheet%20Images/2017%20Ballistic%20and%20Cruise%20Missile%20Threat\\_Final\\_small.pdf?ver=2017-07-21-083234-343](https://www.nasic.af.mil/Portals/19/images/Fact%20Sheet%20Images/2017%20Ballistic%20and%20Cruise%20Missile%20Threat_Final_small.pdf?ver=2017-07-21-083234-343).

<sup>162</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 46.

<sup>163</sup> Global Security, “Weapons of Mass Destruction (WMD),” <https://www.globalsecurity.org/wmd/world/iran/hoveizeh.htm>.

<sup>164</sup> Katzman, *Iran’s Foreign and Defense Policies*, 11.

<sup>165</sup> Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Regional Dominance*, 56.

version of the Noor. The Noor ASCM has a 120-kilometer range and is fitted onboard Iran's submarines, frigates, patrol boats, and some of its small boats. The missiles also can be fired from coastal launchers and fixed wing aircraft. Other C802 modifications are the 200 kilometer Ghader and the 300 kilometer Gadir.<sup>166</sup> Both missiles can be fired from either the seaborne platform or land-based launchers. According to a report from the Global Security organization, Iran would most likely use Ghader and Gadir missiles from shore launchers due to their longer range and to keep Iranian vessels safely inside their bases.<sup>167</sup>

Additionally, Iran has developed the Chinese C-701 to create the Iranian-made Kowsar missile and the Chinese C-704 to create the Iranian version of the Nasr. The Kowsar missile has a 25-kilometer range and is fitted on the Peykaal small boat and can be fired from coastal launchers. The missile is capable to sink small and medium-sized ships, according to an Iranian official.<sup>168</sup> The Nasr has a 35-kilometer range and is fitted onboard many IRIN and IRGCN platforms in addition to fixed wing aircraft and helicopters.<sup>169</sup> According to a Congressional Research Service report, Iran has claimed that the Noor, Kowsar, and Nasr ASCMs are suitable for covering the overall Arabian Gulf, SOH, and Sea of Oman.<sup>170</sup>

Moreover, Iran constructed coastal bases along the Gulf waters, and north of Bandar Abbas in the SOH area for the Raad anti-surface missile. The missile is a modification of the Chinese HY-1 and HY-2 (Silkworm and Seersucker) missiles. The missile achieved a range of 300 kilometers during a firing test in April 2010.<sup>171</sup>

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<sup>166</sup> Defense Intelligence Agency, 86.

<sup>167</sup> Global Security, "Ghader / Qader / Capable - Cruise Missile," February 12, 2019, <https://www.globalsecurity.org/military/world/iran/ghader.htm>.

<sup>168</sup> Global Security, "Kosar / Nasr," August 7, 2019, <https://www.globalsecurity.org/military/world/iran/kosar.htm>.

<sup>169</sup> "Nasr (C-704)," Jane's, June 21, 2019, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JALW9249-JALW>.

<sup>170</sup> Hildreth, *Iran's Ballistic Missile and Space Launch Programs*, 55.

<sup>171</sup> "Weapons: Naval - Raad (HY-1/-2 'Silkworm' Variant/Pirouzi 75)," Jane's, February 17, 2020, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/JSWS0009-JNW\\_](https://customer-janes-com.libproxy.nps.edu/Janes/Display/JSWS0009-JNW_).

Additionally, the IRIN's aviation group has the Fajr Darya (FL-6) short-range anti-ship missile fitted onboard the ASH-3D Sea King and AB212 helicopters, which are operated by IRIN's aviation group. The missile uses an electro-optical seeker that enables it to detect, identify, and select the target. The missile can attack targets within an estimated range of 30 kilometers.<sup>172</sup>

In addition to its missiles arsenal, Iran possesses different types of anti-ship and anti-submarine torpedoes that can be fired from submarines, patrol ships, small boats, and helicopters. The Iranian torpedoes inventory includes the 53–65 KE Russian-made torpedo that is fired from the 533 mm torpedoes tube fitted onboard several IRIA and IRGCN platforms. The torpedo has a maximum range of 26 kilometers and can operate at a maximum depth of 366 meters.<sup>173</sup> Furthermore, Iran possesses North Korean PT-97W and the CHT-02D torpedoes, which are fired from the 533 mm torpedoes tube. Both torpedoes can reach up to 13 kilometers and operate at a maximum depth of 14 meters.<sup>174</sup>

In addition, Iran manufactures the Hoot long-range torpedo which, according to a Jane's report, is copied from the Russian VA-111 Shkval. The torpedo is capable of reaching a distance of 11 kilometers and Iran conducted its first firing test in May 2017.<sup>175</sup> The country also has the Mk-46 torpedoes capable of attacking targets within 11 kilometers and operating in a depth of 366 meters.<sup>176</sup> In addition, the IRGCN has the North Korean 32 cm torpedo, which has a range of 4.8 kilometers and maximum operational depth of 14 meters.<sup>177</sup>

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<sup>172</sup> "Fajr Darya (FL-6)," Jane's, June 17, 2019, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JALW9182-JALW>.

<sup>173</sup> Cordesman and Lin, "The Iranian Sea-Air-Missile Threat to Gulf Shipping," 111.

<sup>174</sup> Cordesman and Lin.

<sup>175</sup> Jane's, "Iran-Navy," Jane's, August 7, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/JWNA0072-JWNA>.

<sup>176</sup> Cordesman and Lin, "The Iranian Sea-Air-Missile Threat to Gulf Shipping," 112.

<sup>177</sup> Cordesman and Lin.

Iran improved its missiles arsenal as a strategic weapon that the nation can use to deter stronger enemies. Moreover, Iran has established several locations to host shore-based ASCMs along the Gulf's coast. Some of Iran's ASCMs are "fired from launchers that are mobile and camouflaged, making them more difficult to locate and destroy."<sup>178</sup> On the other hand, Iran is more likely to use its torpedoes inventory against enemy submarines and shipping at closer range. It also may use them against oil tankers in the Gulf region in case of being attacked by a stronger enemy.

## 7. Drone Systems

Iran started manufacturing UAVs after the Iraq-Iran conflict in 1988.<sup>179</sup> Recently, most of the Iranian forces, including the IRGC, are operating UAVs and Unmanned Surface Vehicles (USV). Iran is seeking strategic gains through its unmanned vehicles program. Due to the vulnerability in its air forces, Iran is pursuing production of unmanned systems because they are affordable and easy to manufacture. In addition, the U.S. sanctions on Iran have led the latter to exploit the cheap unmanned technology to achieve tactical and strategic goals.

Iran developed the first version of its Ababil UAV in 1993.<sup>180</sup> The last variant of this model is the Ababil III, which was first displayed in Iran's media in December 2013.<sup>181</sup> The vehicle is 2.88 meters in length and is capable of reaching 240 kilometers in range. According to a Jane's report, the Ababil III "has been shown carrying a television-guided munition believed to be a Ghaem guided bomb on a hardpoint under a wing."<sup>182</sup>

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<sup>178</sup> Katzman, *Iran's Foreign and Defense Policies*, 12.

<sup>179</sup> "Iranian Unmanned Systems," International Institute for Strategic Studies, December 7, 2017, <https://www.iiss.org/-/media/images/comment/analysis/2017/december/7-drennan2125.pdf?la=en&hash=62D6E91647E0EB1976A2EC42FF3FABF02202A1FF>.

<sup>180</sup> "HESA Ababil," Jane's, April 23, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/juav9028-juav>.

<sup>181</sup> Jane's, "HESA Ababil."

<sup>182</sup> Jane's.

Iran has also developed the Shahed 129 UAV, which has been operated by the IRGC since 2013. The air-borne vehicle is five meters long and capable to reach targets up to 2,000 kilometers range.<sup>183</sup> The craft is intended to perform Command, Control, Communication, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) operations, but also it can be fitted with anti-surface munitions for attack missions.<sup>184</sup> The UAV is capable of 24 hours of non-stop flight, and it could be armed with Sadid missiles, according to an IRGC official.<sup>185</sup>

In addition, Iran produces several versions of the Mohajer UAV, which was first used during the final stages of the Iran-Iraq conflict. The UAV's variants, including the Mohajer-2, the Mohajer-3, which is known as Dorna, the Mohajer-4, also called the Hodhod, and the Mohajer-6. The latest version of the Mohajer-6 is an armed drone in the Mohajer family and was revealed in April 2016.<sup>186</sup> The Mohajer-6 is 5.7 meters total length and capable to reach a distance of 2,000 kilometers.<sup>187</sup> The vehicle could carry missiles such as the Ghaem 1 for anti-surface strike missions. Furthermore, Iran manufactures the Sadeq UAV, which is believed to be a duplicated version of the U.S.-made RQ-170 Sentinel UAV. The vehicle operates at an altitude of 25,000 feet and is fitted with an air-to-air missile.<sup>188</sup>

Moreover, Iran has developed the Toufan UAV, which is a smaller size and high-speed vehicle that makes it difficult to detect and respond to. The vehicle is a one-way UAV and its main role is surface strike using an optical sensor to detect the target.<sup>189</sup>

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<sup>183</sup> "HESA Shahed 129," Jane's, March 19, 2020, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/juavb032-juav>.

<sup>184</sup> Jane's, "HESA Shahed 129."

<sup>185</sup> Cordesman and Lin, "The Iranian Sea-Air-Missile Threat to Gulf Shipping," 112.

<sup>186</sup> "Qods Mohadjer," Jane's, September 24, 2019, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/juav9167-juav>.

<sup>187</sup> Jane's, "Qods Mohadjer,"

<sup>188</sup> Drennan, "Iranian Unmanned Systems," 3.

<sup>189</sup> "Iran- Unmanned Air Vehicle (UAV)- Summary," Global Security, April 21, 2020, <https://www.globalsecurity.org/military/world/iran/uav-list.htm>.



Iran also builds the Fotros UAV, which is regarded as the largest Iranian UAV. The drone has a flying ceiling of 25,000 feet and a maximum range of 2,000 kilometers.<sup>190</sup> The UAV, which is operated by the Artesh, can be equipped with many kinds of air-to-surface missiles for combat missions and can carry out other missions like surveillance and reconnaissance.<sup>191</sup>

Additionally, Iran makes the Karrar UAV, considered the first Iranian-made long-range drone capable of performing surveillance and reconnaissance missions with a maximum range of 1,000 kilometers.<sup>192</sup> The Karrar vehicle is believed to be a modification of the U.S. MQM-107 Streaker, which was exported to the country before the revolution.<sup>193</sup> According to a Jane's report, the Karrar can carry guided bombs such as the Balaban and Yasin.<sup>194</sup> Iran also manufactures the Hamaseh drone that is capable to conduct both surveillance and strike missions. The drone is 5 meters in length and reaches a range of 200 kilometers, and capable of carrying missiles and a 107 mm artillery rocket.<sup>195</sup> The UAV is run by the IRGC and it can conduct suicide attacks against land and sea targets.<sup>196</sup> The vehicle can be used during the day and night, and it operates at an altitude from half a meter to 900 meters.<sup>197</sup>

Moreover, Iran has the stealthy design Saegah strike drone that is copied from the U.S. RQ-170. The drone can carry up to four guided bombs.<sup>198</sup> Iran also operates the

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<sup>190</sup> "Iran Unveils 'Strategic' UAV," Jane's, November 20, 2013, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/jdw53910-jdw-2013>.

<sup>191</sup> Jane's, "Iran Unveils 'Strategic' UAV."

<sup>192</sup> Drennan, "Iranian Unmanned Systems," 3.

<sup>193</sup> Drennan.

<sup>194</sup> "Iran Holds Unveiling Event for Precision-Guided Bombs," Jane's, August 8, 2019, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG\\_2316384-JDW](https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG_2316384-JDW).

<sup>195</sup> "HESA Hamaseh," Jane's, September 23, 2019, <https://customer-janes-com.libproxy.nps.edu/Janes/Display/juavb033-juav>.

<sup>196</sup> Global Security, "Iran- Unmanned Air Vehicle (UAV)- Summary."

<sup>197</sup> Global Security.

<sup>198</sup> "Iran Unveils New Version of Armed Stealth UAV," Jane's, January 31, 2019, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG\\_1549276-JDW](https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG_1549276-JDW).

Raad-85 attack drone, which is capable of reaching 100 kilometers in range.<sup>199</sup> In addition, Iran has several other UAVs used for reconnaissance missions such as the 500-kilometer range Mohajem-92,<sup>200</sup> the Yaser drone, which can fly in a radius of up to 200 kilometers, and the Nazer mini-helicopter drone.

In addition to its current UAV inventory, Iran is manufacturing USVs for use in surface missions such as reconnaissance and attack surface units. According to a report from the BBC, Iran revealed a highly maneuverable USV called the Ariana during a ceremony at the Islamic Azad University in Tehran on December 16, 2012.<sup>201</sup> The boat can travel at a speed of 30 knots and carry a payload of four kilograms.<sup>202</sup> The unit is run by the IRGC.

These UAV systems are very accurate and can cause significant damage. Moreover, they are low-cost products. Accordingly, unmanned systems are most likely a weapon that Iran may use to target GCC oil facilities. Nevertheless, it is also most likely that Iran would provide UAV systems to its proxies in Iraq and Yemen and direct them to pose attacks on Gulf oil facilities.

#### **D. CONCLUSION**

By understanding the Iran's capabilities that Tehran might exploit to threaten the Gulf's oil output, it is possible to conclude which weapons Iran would most likely use to attack the oil resources in the Gulf region. Additionally, studying Iran's capability can help to identify the potential actors who might initiate aggression threatening oil output in that region. The chapter has described most of the military bases and assets Iran possesses, including air and naval platforms in addition to missiles, torpedoes, mines, small arms, and drone systems. Despite U.S. sanctions, Iran continues to pursue its

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<sup>199</sup> Drennan, "Iranian Unmanned Systems," 3.

<sup>200</sup> Drennan, 4.

<sup>201</sup> "Iran Produces Unmanned Surface Vehicle - Press TV," BBC Monitoring Middle East, December 16, 2012, <http://libproxy.nps.edu/login?url=https://www-proquest-com.libproxy.nps.edu/docview/1238954472?accountid=12702>.

<sup>202</sup> "Iran Produces Unmanned Surface Vehicle - Press TV."

domestic arms production to keep its military might. According to the Iranian capabilities discussed in this chapter, it is most likely that Iran's strength lies in its missiles, mines, and drones inventory. These weapons are mainly launched by small boats and could pose medium threats to Gulf oil output. Iran is focusing on these technologies due to their efficiency and accuracy in hitting short-range targets, such as oil shipping and oil facilities in the Gulf region. Iranian proxies are also regarded as a critical capability that the nation has already used to threaten the Gulf's oil infrastructure.

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### III. CASE STUDIES

In 2019, there were a few violent incidents involving Gulf oil production infrastructure in which Iran has been either accused or suspected. These incidents, including attacks on civilian shipping and oil installations in the Gulf region, provide potential insight into Iran's attitude and ambitions toward the Gulf oil installations. Such events can be studied to evaluate the Iranian intentions toward the GCC oil output, the approach Iran takes toward threatening its neighbors, and some of the tactics it can employ against the oil industry. Moreover, they are useful for understanding some of Iran's strengths and weaknesses. Iran's recent hostile activities against the GCC oil interests in the region also provide key knowledge concerning the actors who perform such actions. These activities also help clarify some of Iran's potential goals in the Gulf area.

This chapter discusses a few recent incidents in the Gulf area, which were performed by Iran or its proxies in the region. The chapter focuses on four main incidents that occurred in the past year. The first case is the sabotage attack on two Saudi, one UAE, and one Norwegian oil tanker in the vicinity of Al Fujairah Port on May 12, 2019.<sup>203</sup> The second case study is the explosive strike on two oil tankers in the Gulf of Oman, near to the SOH. The incident occurred on June 13, 2019, when Marshall Islands and Panama-flagged ships were attacked, resulting in fire and hull damage.<sup>204</sup> The third incident was the attacks on Saudi oil installations in Abqaiq and Khurais on September 14, 2019. According to U.S. officials, the strikes originated from southwestern Iran.<sup>205</sup>

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<sup>203</sup> "International Maritime Organization Council Condemns Tanker Attacks in Strait of Hormuz and Sea of Oman," IMO, July 18, 2019, <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/15-IMO-Council-condemns-tanker-attacks.aspx>.

<sup>204</sup> IMO, "International Maritime Organization Council Condemns Tanker Attacks in Strait of Hormuz and Sea of Oman."

<sup>205</sup> Phil Stewart and Parsia Hafezi, "Saudi Oil Attacks Came from Southwest Iran, U.S. Official Says, Raising Tensions," Reuters, September 17, 2019, <https://www.reuters.com/article/us-saudi-aramco/saudi-oil-attacks-came-from-southwest-iran-u-s-official-says-raising-tensions-idUSKBN1W2184>.

The investigation showed the strikes were carried out with Iranian weapons.<sup>206</sup> Although there is no certainty about Iran’s involvement in the recent aggressions, the evidence points at the Iranians or their agents as the perpetrators of these attacks. Finally, the chapter concludes with a brief analysis of the cases, summarizing the Iranian tactics and operations used in the attacks.

## A. CASES

The locations of the cases discusses in this section are identified on the map in Figure 2 at the end of this chapter.

### 1. Al Fujairah, May 12, 2019

The first case involves the sabotage attack on commercial ships in the vicinity of the Al Fujairah anchorage area on Sunday, May 12, 2019. Al Fujairah is one of the seven Emirates, and its commercial seaport is regarded as one of the largest bunkering hubs in the world. According to a statement from the Emirates News Agency (ENA), “four commercial ships [were] subjected to sabotage operations near UAE territorial waters, [but] no fatalities or injuries [were] reported.”<sup>207</sup> The attack occurred in the morning local time at Al Fujairah anchorage area, and it targeted the oil tankers Amjad and Al-Marzoqah owned by Saudi Arabia, the Andrea Victory owned by Norway, and the A. Michel owned by the UAE. According to a Reuters report, the Saudi Minister of Energy said that “one of the two Saudi vessels was attacked in the UAE economic zone on its way to being loaded with Saudi crude from Ras Tanura port for delivery to state-owned Aramco’s customers in the United States.”<sup>208</sup> Additionally, a report from *The Wall Street Journal* said that a “Saudi-flagged tanker called Al-Marzoqah, suffered an explosion after

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<sup>206</sup> Stewart and Hafezi, “Saudi Oil Attacks Came from Southwest Iran, U.S. Official Says, Raising Tensions.”

<sup>207</sup> Nour Salman, “Four Commercial Ships Subjected to Sabotage Operations near UAE Territorial Waters, No Fatalities or Injuries Reported,” Emirates News Agency, May 12, 2019, <https://www.wam.ae/en/details/1395302762084>.

<sup>208</sup> Rania El Gamal and Bozorgmehr Sharafedin, “Saudi Oil Tankers among Those Attacked off UAE amid Iran Tensions,” Reuters, May 13, 2019, <https://www.reuters.com/article/us-saudi-oil-tankers-fujairah/saudi-oil-tankers-among-those-attacked-off-uae-amid-iran-tensions-idUSKCN1SJ088>.

its main engine caught on fire.”<sup>209</sup> The Saudi Energy Minister described the attack’s result as significant damage despite no oil being spilled from the tankers.<sup>210</sup>

The Norwegian ship also suffered a sabotage attack during the same interval while it was anchored at the anchorage zone off Al Fujairah port. Pictures from Reuters news agency show the oil tanker with a hole in its hull at the waterline level and the metal torn inwards.<sup>211</sup> The UAE’s oil tanker also showed similar damage. A picture posted by the national news agency in the UAE shows a hole below the water line in the hull of the Emirati’s vessel, which seems that the attacker placed the detonation charge below the submerged part of the ship’s hull.<sup>212</sup>

Although there was no certain information about the type of weapon used in the attacks, the director of the Joint Staff in the U.S. Navy, Rear Admiral Michael Gilday, said that the attacks were performed by the IRGC using a limpet sea mines.<sup>213</sup> According to the U.S. official, an American destroyer in the region tracked 20 IRGC boats entering the UAE territorial waters a few hours before the attack.<sup>214</sup> The U.S. official added that “divers on the Iranian boats planted the magnetic limpet mines with timers on the hulls of the four ships.”<sup>215</sup> The Pentagon also accused the IRGC of the attacks.

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<sup>209</sup> Summer Said, Nancy A. Youssef, and Benoit Faucon, “U.S. Says Iran Likely Behind Ship Attacks,” *The Wall Street Journal*, May 13, 2019, <https://www.wsj.com/articles/saudi-oil-tankers-attacked-before-entering-persian-gulf-11557725971>.

<sup>210</sup> Gamal and Sharafedin, “Saudi Oil Tankers among Those Attacked off UAE amid Iran Tensions.”

<sup>211</sup> Gamal and Sharafedin.

<sup>212</sup> Joyce Karam, “State Actor’ Likely to Blame in Fujairah Tanker Attacks, Report Says” *The National*, June 7, 2019, <https://www.thenational.ae/world/mena/state-actor-likely-to-blame-in-fujairah-tanker-attacks-report-says-1.871530#2>.

<sup>213</sup> Phil Stewart and Idrees Ali, “Pentagon Accuses Iran’s Revolutionary Guards over Tanker Attacks” *Reuters*, May 24, 2019, <https://www.reuters.com/article/us-usa-iran-military-tankers/pentagon-accuses-irans-revolutionary-guards-over-tanker-attacks-idUSKCN1SU22K>.

<sup>214</sup> Dion Nissenbaun, “U.A.E. Stops Short of Directly Accusing Iran Over Attacks on Ships,” *The Wall Street Journal*, June 6, 2019, <https://www.wsj.com/articles/u-a-e-stops-short-of-directly-accusing-iran-over-attacks-on-ships-11559871239>.

<sup>215</sup> Nissenbaun, “U.A.E. Stops Short of Directly Accusing Iran Over Attacks on Ships.”

According to a confidential assessment issued by the Norwegian Shipowners' Mutual War Risk Insurance Association (DNK), the attack on the Andrea Victory was likely done by a surface unit belonging to the IRGC that maneuvered close to the vessel and launched an underwater drone carrying 30–50 kg of high-grade explosive to detonate on impact.<sup>216</sup>

This assessment was based on a few factors including the probability that the IRGC provided the Houthi in Yemen with drone boats capable of attacking targets using a GPS system. Moreover, the shrapnel found on the Norwegian ship was very similar to that from drone boats used by Houthi insurgents.<sup>217</sup> Additionally, the IRGC had recently threatened to use force against enemies in the region. According to DNK, the attack occurred in an area six to ten nautical miles from Al Fujairah, and it was intended to send a message to the United States that Iran did not need to block the SOH to disrupt freedom of navigation in the region.<sup>218</sup>

A month after the attack, a report issued by a joint investigation consisting of Saudi Arabia, Norway, and UAE concluded that the operation was sophisticated and coordinated and the perpetrator had significant operational capacity. In addition, the attack appeared most likely done by divers using a limpet mine and deployed from a speed boat. The report blamed a state actor as a most likely perpetrator.<sup>219</sup>

On the other hand, Iran denied its responsibility for the attack, while its Foreign Minister said that the attack was performed by “extremist individuals” and further deflected blame by accusing the U.S. government of pursuing dangerous policies in the

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<sup>216</sup> Jonathan Saul and Gladys Fouche, “Exclusive: Insurer Says Iran’s Guards Likely to Have Organized Tanker Attacks,” Reuters, May 17, 2019, <https://www.reuters.com/article/us-usa-iran-oil-tankers-exclusive/exclusive-insurer-says-irans-guards-likely-to-have-organized-tanker-attacks-idUSKCN1SN1P7>.

<sup>217</sup> Saul and Fouche, “Exclusive: Insurer Says Iran’s Guards Likely to Have Organized Tanker Attacks.”

<sup>218</sup> Saul and Fouche.

<sup>219</sup> Karam, “State Actor’ Likely to Blame in Fujairah Tanker Attacks, Report Says.”



region.<sup>220</sup> Moreover, a spokesman from the Iranian Foreign Ministry said that the incident “has a negative impact on maritime transportation security.”<sup>221</sup> Yet, Iran’s denial and statements could be an attempt to distance itself from the incident.

## 2. Gulf of Oman, June 13, 2019

A similar sabotage attack occurred on June 13, 2019, when Japanese and Norwegian oil tankers were assaulted, which resulted in extensive damage.<sup>222</sup> The targeted oil tankers Kokuka Courageous and Front Altair were attacked while they were in the Gulf of Oman. Front Altair was a Marshall Islands-flagged ship that was sailing from Abu Dhabi’s al-Ruwais refinery to Taiwan with a 75,000-ton cargo of naphtha.<sup>223</sup> Kokuka Courageous was a Panama-flagged, Japanese-owned tanker that was carrying 25,000 tons of methanol from the UAE to Taiwan.<sup>224</sup> The U.S. Fifth Fleet received a distress call from Front Altair at 6:12 am. According to a statement from U.S. Central Command (CENTCOM), a U.S. MQ-9 drone arrived eight minutes later and observed a fire on the tanker.<sup>225</sup> Less than an hour later after this incident, another distress call was received from Kokuka Courageous at 7:00 a.m. local time, 21 nm off the coast of Iran, and approximately 10 nm away from the Altair incident.<sup>226</sup>

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<sup>220</sup> Saul and Fouche, “Exclusive: Insurer Says Iran’s Guards Likely to Have Organized Tanker Attacks.”

<sup>221</sup> Gamal and Sharafedin, “Saudi Oil Tankers among Those Attacked off UAE amid Iran Tensions.”

<sup>222</sup> Vasco Cotovio, Helen Regan, and Kara Fox, “Two Tankers Struck in Apparent Attack in Gulf of Oman,” CNN, June 13, 2019, <https://www.cnn.com/2019/06/13/middleeast/sea-of-oman-tanker-intl/index.html>.

<sup>223</sup> Farzin Nadimi, “Iran Seems Prepared for Major—But Measured—Escalation in the Gulf,” The Washington Institute, June 14, 2019, <https://www.washingtoninstitute.org/policy-analysis/view/iran-seems-prepared-for-majorbut-measuredescalation-in-the-gulf>.

<sup>224</sup> “Japan Shipping Company Kokuka Sangyo Says Its Tanker Was Attacked in Gulf,” Reuters, June 13, 2019, <https://www.reuters.com/article/us-mideast-tanker-japan/japan-shipping-company-kokuka-sangyo-says-its-tanker-was-attacked-in-gulf-idUSKCN1TE1DW>.

<sup>225</sup> Department of Defense, *Statement from U.S. Central Command on Attacks against U.S. Observation Aircraft* (Tampa, FL: U.S. Central Command, June 16, 2019), <https://www.centcom.mil/media/statements/statements-view/article/1877252/statement-from-us-central-command-on-attacks-against-us-observation-aircraft/>.

<sup>226</sup> “Gulf of Oman Tanker Attacks: What We Know,” BBC, June 18, 2019, <https://www.bbc.com/news/world-middle-east-48627014>.

A press release from Frontline Company stated that explosions had occurred on the Front Altair, causing the fire, and the company ruled out the possibility that the incident was caused by mechanical or human error.<sup>227</sup> In addition, the company denied reports from the Iranian News Agency that the vessel had sunk.<sup>228</sup> According to Reuters, a Taiwanese refiner, CPC Corp, said that the vessel was “suspected of being hit by a torpedo.”<sup>229</sup> The attack resulted in a hole in the vessel’s hull above the waterline. Bernhard Schulte Ship Management, the manager of Kokuka Courageous oil tanker, released an official statement that the tank was damaged because of a “suspected attack.” They also stated that the hull had been breached above the water line on the starboard side.<sup>230</sup> An official statement by CENTCOM says that the Japanese motor vessel Kokuka Courageous was attacked by an explosion, and likely a limpet mine left serious damage in the hull.<sup>231</sup> The statement mentioned that at 8:09 a.m. the same day, a U.S. aircraft observed an IRGC Hendijan class patrol boat and multiple IRGC fast attack craft/fast inshore attack craft (FAC/FIAC) in the vicinity of Front Altair.<sup>232</sup> Moreover, the CENTCOM said that an “IRGC Gashti Class patrol boat approached the M/T Kokuka Courageous at 4:10 p.m. local time and was observed and recorded removing unexploded limpet mine from the M/T Kokuka Courageous.”<sup>233</sup> Additionally, CENTCOM released a

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<sup>227</sup> “FRO – Update Regarding Front Altair,” Frontline, June 14, 2019, <https://www.frontline.bm/fro-update-regarding-front-altair-2/>.

<sup>228</sup> Frontline, “FRO – Update Regarding Front Altair.”

<sup>229</sup> “Factbox: Latest on Tanker Attacks South of Strait of Hormuz,” Reuters, June 13, 2019, <https://www.reuters.com/article/us-mideast-tankers-facts-idUSKCN1TE142>.

<sup>230</sup> “Bernhard Shulte Says Its Tanker Kokuka Courageous Damaged after ‘Suspected Attack,’” Reuters, June 13, 2019, <https://in.reuters.com/article/mideast-tanker-evacuation/bernhard-shulte-says-its-tanker-kokuka-courageous-damaged-after-suspected-attack-idINKCN1TE0UY>.

<sup>231</sup> U.S. Central Command, *U.S. Central Command Statement on June 13 Limpet Mine Attack in the Gulf of Oman* (Tampa, FL: June 13, 2019), <https://www.centcom.mil/MEDIA/STATEMENTS/Statements-View/Article/1875666/us-central-command-statement-on-june-13-limpet-mine-attack-in-the-gulf-of-oman/via/newsletter/source/rabbithole/>.

<sup>232</sup> U.S. Central Command, *U.S. Central Command Statement on June 13 Limpet Mine Attack in the Gulf of Oman*.

<sup>233</sup> U.S. Central Command.

video showing the Iranian craft removing the mine from the oil tanker.<sup>234</sup> Furthermore, on June 17, 2019, the Pentagon released photos taken from the MH-60R helicopter saying the photos show IRGC removing an unexploded limpet mine from the tank.<sup>235</sup> Nevertheless, Iran denied these allegations and said that the fire was due to technical issues.<sup>236</sup>

The president of the Kokuka Sangyo shipping company, Yutaka Katada, said the tank crew thought the vessel was hit by flying objects. Furthermore, he said that “Something came flying toward them, then there was an explosion.”<sup>237</sup> The U.S. Secretary of State Mike Pompeo blamed Iran for the explosions “based on intelligence, the weapons used, the level of expertise needed to execute the operation.”<sup>238</sup> The Pentagon also stated that “Iran is responsible for the attack based on video evidence and the resources and proficiency needed to quickly remove the unexploded limpet mine.”<sup>239</sup> The United Kingdom agreed with the U.S. allegations against Iran and said, in an official statement, that “It is almost certain that a branch of the Iranian military—the IRGC—attacked the two tankers on 13 June.”<sup>240</sup>

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<sup>234</sup> U.S. Central Command Public Affairs, *Unexploded Limpet Mine Removed from M/T Kokuka Courageous in the Gulf of Oman* (Tampa, FL: U.S. Central Command, June 13, 2019), <https://www.centcom.mil/media/video-and-imagery/videos/videoid/689676/>.

<sup>235</sup> Anthony Capaccio, “Pentagon Shares New Photos, Timeline of Gulf Oil Tanker Attacks,” Bloomberg, June 17, 2019, <https://www.bloomberg.com/news/articles/2019-06-17/pentagon-shares-new-photos-timeline-of-gulf-oil-tanker-attacks>.

<sup>236</sup> “Early Investigations into Oil Tankers Incidents Show Fire Started for Technical Problems,” Fars News Agency, June 14, 2019, <https://en.farsnews.ir/newstext.aspx?nn=13980324000337>.

<sup>237</sup> Simon Denyer and Carol Moerlli, “Japanese Ship Owner Contradicts U.S. Account of How Tanker Was Attacked,” *Washington Post*, June 14, 2019, [https://www.washingtonpost.com/world/japanese-ship-owner-contradicts-us-account-of-how-tanker-was-attacked/2019/06/14/7ea347d0-8eba-11e9-b6f4-033356502dce\\_story.html](https://www.washingtonpost.com/world/japanese-ship-owner-contradicts-us-account-of-how-tanker-was-attacked/2019/06/14/7ea347d0-8eba-11e9-b6f4-033356502dce_story.html)

<sup>238</sup> “US Says Video Shows Iranian Military Removing Mine from Tanker,” *The Guardian*, June 13, 2019, <https://www.theguardian.com/us-news/2019/jun/13/mike-pompeo-iran-gulf-oil-tanker-attacks>.

<sup>239</sup> Capaccio, “Pentagon Shares New Photos, Timeline of Gulf Oil Tanker Attacks.”

<sup>240</sup> Foreign & Commonwealth Office and The Rt. Hon. Jeremy Hunt MP, *Gulf of Oman Attacks: UK Statement* (London, UK : June 14, 2019), <https://www.gov.uk/government/news/gulf-of-oman-attacks-uk-statement>.

Both the Al-Fujairah and the Gulf of Oman incidents reveal Iran's intentions toward the Gulf oil market. Moreover, they indicate the Iranian's methodology for threatening maritime navigation within the Gulf sea area. The attacks show Iran's capabilities to threaten the merchant ships in the region. The attacks also manifest that the IRGC is a crucial instrument that Iran depends on to menace the Gulf oil industry. Yet, Iran realizes the consequences of targeting the oil market and the significance of its attack to many countries, including Iran's friends such as Russia and China. Therefore, Iran follows covert operations to distance itself from blame. The incidents also show the Iranian dependence on their sea mine inventory that offers detonation power and low cost.

### **3. Shaybah Attack, August 17, 2019**

The attack on the Shaybah oil field in Saudi Arabia is another example of Iran's aggression directed at the Gulf's oil output. The oil plant is located near the Saudi and UAE border and approximately 1,000 kilometers from the Houthi-controlled area in Yemen.<sup>241</sup> The facility is one of significance to the Saudi's oil infrastructure that has a production capacity of 1 mb/d.<sup>242</sup> Shaybah oilfield is a vital facility as described by the Saudi Energy Minister Khalid al-Falih.<sup>243</sup> Al-Falih has also acknowledged the Iranian threats to oil infrastructure in the Gulf region by saying that the "attack was part of a series launched against the kingdom's oil infrastructure, including sabotaged oil vessels in the Gulf of Oman and damaged pipelines."<sup>244</sup>

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<sup>241</sup> "Damage at Saudi Gas Field 'limited' after Houthi Drone Attack, Says Minister," *The National*, August 17, 2019, <https://www.thenational.ae/world/gcc/damage-at-saudi-gas-field-limited-after-houthi-drone-attack-says-minister-1.899303>.

<sup>242</sup> "Shaybah, The Most Remote Treasure on Earth," Aramco, Accessed on August 8, 2020, <https://www.aramco.com/en/who-we-are/mega-projects/shaybah#>).

<sup>243</sup> Maher Ghmaytelli and Rania El Gamal, "Houthi Drone Attack on Saudi Oilfield Causes Gas Fire, Output Unaffected," Reuters, August 17, 2019, <https://www.reuters.com/article/us-yemen-saudi-oil-attack-idUSKCN1V705R>.

<sup>244</sup> Sune Engel Rasmussen, "Iran-Aligned Houthis Strike Major Saudi Oil Field Shaybah Oil Field Is Attacked but Crude Production Isn't Disrupted," *The Wall Street Journal*, August 17, 2019, <https://www.wsj.com/articles/iran-aligned-houthis-strike-major-saudi-oilfield-11566043672>.

The attack took place on August 17, 2019, in the morning local time. According to the Aramco 2019 annual report, Shaybah Natural Gas Liquids (NGL) was attacked by five UAVs, resulting in a small fire and limited damage to the processing and cogeneration infrastructure at the facility.<sup>245</sup> The fire was quickly controlled by Aramco's firefighting team.<sup>246</sup> The restoration of the facility's operation took two weeks.<sup>247</sup> Pro-Iranian Houthi rebels in Yemen claimed responsibility for the attack that used a Qasef-2K UAV. The Qasef-2K is an improved version of the Qasef-1, which was identified by a UN panel of experts as the Iranian UAV Ababil-2 or Ababil-T.<sup>248</sup> The drone detonates at 20 meters altitude and produces an elliptical-shaped pattern with a lethal range of 30 to 80 meters and a half lethal range of 50 to 160 meters.<sup>249</sup> The Yemeni rebels released a video showing a Qasef-2K test-fire that indicated an improvement in the weapon's attack profile to make it more effective..<sup>250</sup> According to a report from the Security Council of the United Nations, however, a panel of experts in Yemen found that the drone used in the Shaybah attack was a UAV-X, which the panel referred to as the Samad UAV.<sup>251</sup> The latest version of the Samad UAV is the Samad-3, which carried a warhead of 18 kg of explosive and reached an operational range of 1,200 to 1,500 kilometers.<sup>252</sup> The Houthis' spokesman said that the movement had used Qasef-

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<sup>245</sup> *Saudi Aramco Annual Report 2019, This Is Energy This Is Aramco* (Dhahran: Saudi Aramco, 2019), 53, <https://www.aramco.com/-/media/publications/corporate-reports/saudi-aramco-ara-2019-english.pdf>

<sup>246</sup> Ghmaytelli and El Gamal, "Houthi Drone Attack on Saudi Oilfield Causes Gas Fire, Output Unaffected."

<sup>247</sup> *Saudi Aramco Annual Report 2019, This Is Energy This Is Aramco*.

<sup>248</sup> "Analysis: Yemeni Rebels Reveal Qasef-2K Testing and Attacks," Jane's, January 18, 2019, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG\\_1504090-JDW](https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG_1504090-JDW).

<sup>249</sup> Jane's, "Analysis: Yemeni Rebels Reveal Qasef-2K Testing and Attacks."

<sup>250</sup> Jane's.

<sup>251</sup> United Nations, *Letter Dated 27 January 2020 from the Panel of Experts on Yemen Addressed to the President of the Security Council* (UN Security Council, January 27, 2020), 21, [https://digitallibrary.un.org/record/3850088/files/S\\_2020\\_70-EN.pdf](https://digitallibrary.un.org/record/3850088/files/S_2020_70-EN.pdf).

<sup>252</sup> United Nations, *Letter Dated 25 January 2019 from the Panel of Experts on Yemen Addressed to the President of the Security Council* (UN Security Council, January 25, 2019), 30, [https://digitallibrary.un.org/record/1664359/files/S\\_2019\\_83-EN.pdf](https://digitallibrary.un.org/record/1664359/files/S_2019_83-EN.pdf).

K2 and Samad-3 UAVs against several targets belonging to both Saudi Arabia and the UAE. The spokesman did not mention the type of UAV that attacked the Shaybah oil facility. Nevertheless, the Samad-3 is the potential drone used in the attack.

The Shaybah oil facility incident reveals the Iranian ambitions regarding the Gulf oil output. Additionally, it shows Iran's pattern and approaches to threaten Gulf states' oil production. The attack also indicates the similarity in weapons used by Iran and weapons owned by its proxies in the region. Houthi rebels in Yemen, who also call themselves "Ansar Allah," claimed they manufactured the UAVs used for the Shaybah attack. Yet, several investigations show a high similarity between the Iranian and the Houthis' drones. For instance, a report issued by the Conflict Armament Research (CAR) organization mentions that Houthi forces unveiled a collection of UAVs in July 2019, which they claimed to be manufactured locally.<sup>253</sup> Shortly afterward, the Iranian Press TV showed a short video profiling the same UAV type. The report also showed that parts of munitions found in the sabotaged locations examined by the investigation team lacked the lot number required to identify the weapon. Such findings suggest that the Houthi militia probably removed any part of the weapon indicating that it was Iranian-made in order to claim its production.

The strike on the oil facilities at Shaybah emphasizes Iran's hostilities against Gulf oil production capabilities. Additionally, it asserts the role of Iran's proxies in the war against oil output in the Gulf region. Moreover, Iran's clients in the region, such as the Houthi group in Yemen, play a significant role in achieving Iran's objectives in the Gulf area. Iran provides these groups with instructions, training, and munitions to successfully perform attacks on Gulf interests. According to a report from the Security Council, a Houthi delegation, earlier in the week of the Shaybah aggression, held meetings with the Iranian Supreme Leader Ali Khamenei and Foreign Minister Javad

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<sup>253</sup> Conflict Armament Research, *Evolution of UAVs Employed by Houthi Forces in Yemen* (London: Conflict Armament Research, February 2020), 4, [https://www.conflictarm.com/download-file/?report\\_id=3185&file\\_id=3189](https://www.conflictarm.com/download-file/?report_id=3185&file_id=3189).

Zarif at Tehran.<sup>254</sup> The meeting was likely held to give advance instructions to carry out the attack.

#### **4. Aramco Attack, September 14, 2019**

A more serious strike against the Gulf oil sector was the attack on Saudi oil plants on Saturday, September 14, 2019, at 0400 local time. This strike targeted the Saudi oil facilities in Abqaiq and Khurais, which belong to the Saudis' own Aramco oil company in the eastern part of the country. The Abqaiq oil plant is one of the most critical oil supply facilities in the world. It contains one of the largest oil fields in the world and is the main oil processing center for extra light and light crude oil.<sup>255</sup> The plant is a key processing facility for Saudi Arabia with a maximum capacity of 7 mb/d.<sup>256</sup> Khurais is also regarded as an important Saudi oil installation. Production at the oil field began on June 10, 2009, adding 1.2 mb/d of Arabian light crude oil production capability, 320 million standard cubic feet per day (scfd) of gas dehydration, and 80,000 b/d of NGL production.<sup>257</sup> Additionally, the plant is the largest intelligent oil field in the world and the second facility to be included in the World Economic Forum's (WEF) prestigious Global Lighthouse Network.<sup>258</sup>

The Saudi oil installations were hit by missiles and aerial drones carrying explosive charges most likely launched by Iranian clients in the GCC region. The attack

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<sup>254</sup> Security Council, "September 2019 Monthly Forecast," Security Council Report, August 30, 2019, <https://www.securitycouncilreport.org/monthly-forecast/2019-09/yemen-10.php>.

<sup>255</sup> Michael Ratner, Christopher M. Blanchard, and Heather L. Greenley, *Attacks on Saudi Oil Rattle Markets*, CRS Report No. IN11167 (Washington, DC: Congressional Research Service, September 26, 2019), <https://crsreports.congress.gov/product/pdf/IN/IN11167>.

<sup>256</sup> Ratner, Blanchard, and Greenley, *Attacks on Saudi Oil Facilities: Effects and Responses*.

<sup>257</sup> "Khurais Field Development," Aramco, Accessed on August 10, 2020, <https://www.aramco.jobs/about-saudi-aramco/mega-projects/khurais-field-development>

<sup>258</sup> "Khurais Becomes Second Aramco Facility to Join Prestigious WEF Global Lighthouse Network," Aramco, September 15, 2020, <https://www.aramco.com/en/news-media/news/2020/khurais-joins-wef-global-lighthouse-network>.

was the second on Saudi oil installations in one month after the attack on the Shaybah natural gas plant.<sup>259</sup>

The Abqaiq attack caused explosions, fires, and significant damage to equipment at each facility. The fire had been brought under control by the company's firefighting team by the early evening of the same day. Meanwhile, the assault temporarily reduced the plant's oil production by 5.7 mb/d.<sup>260</sup> Nevertheless, production was restored to pre-attack levels within 11 days.<sup>261</sup>

To investigate the incident, a team from the United States, Europe, Saudi Arabia, and the United Nations was established to look over the case. A report that resulted from the investigations contained pictures of fragments of the weapon used for the attack. The pieces found, including an engine and vertical gyroscope from a UAV used in the assault, were similar to components used in the Iranian-made Sahad-123 UAV.<sup>262</sup> The report designated the drone used in the attack as an IRN-05 (Mohajer).<sup>263</sup> Moreover, this material also had been found in Iranian drones recovered in Yemen, Iraq, and Israel.<sup>264</sup>

Although the Houthi group claimed responsibility for the attack, a Saudi official said that the attack was not launched from Yemen. Echoing this view, a report from the Washington Institute also stated that the attack on Abqaiq and Khurais could not have originated from Yemen.<sup>265</sup> The report, which was issued by the U.N. Panel of Experts on Yemen, stated that the attack was conducted by a delta-wing UAV and a Quds-1 cruise

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<sup>259</sup> Carla, Sertin, "Saudi Aramco Shaybah Gas Plant Hit in Houthi Drone Attack," Oil and Gas Middle East, August 18, 2019, [http://libproxy.nps.edu/login?url=https://search.proquest.com/docview/227485563\\_6?accountid=12702](http://libproxy.nps.edu/login?url=https://search.proquest.com/docview/227485563_6?accountid=12702).

<sup>260</sup> "Incidents at Abqaiq and Khurais," Aramco, September 14, 2019, <https://www.aramco.com/en/news-media/news/2019/incidents-at-abqaiq-and-khurais>.

<sup>261</sup> *Aramco Annual Report 2019*, 8.

<sup>262</sup> Tim Michetti, "Expediting Evidence of Iranian Attacks: The Aramco Case," The Washington Institute, January 21, 2020, <https://www.washingtoninstitute.org/policy-analysis/view/expediting-evidence-of-iranian-attacks-the-aramco-case>.

<sup>263</sup> Michetti, "Expediting Evidence of Iranian Attacks: The Aramco Case."

<sup>264</sup> Michetti.

<sup>265</sup> Nadimi, "The UN Exposes Houthi Reliance on Iranian Weapons."



missile.<sup>266</sup> Additionally, the report suggested these weapons were most likely produced outside Yemen due to their high quality.<sup>267</sup> The investigation indicated that the UAV used for the attack was a potential modification of the Chinese ASN-301 drone, which has a maximum range of 280 kilometers. Eighteen of these Chinese-made UAVs can be fired from boxes stacked together on a truck-bed, which is approximately the same number of UAVs that attacked the oil facilities in Abqaiq and Khurais.<sup>268</sup> Additionally, the UAVs performed the attack fitted with two unlicensed copies of either a British AR-731 or its Chinese version, the MDR-208 engines. According to the report, Iran has manufactured at least two local versions of the MDR-208 that were used in the Iranian UAVs the Shahed-783 and the Serat-01.<sup>269</sup> The report also indicated that Iran obtained a number of ASN-301 drones in the past. Referring to data regarding horsepower, fuel capacity, and fuel consumption, the U.N. team found that UAVs fitted with these types of motors can travel up to distances of 180 to 300 kilometers, which is closer to the ASN-302's range.<sup>270</sup>

The Qud-1 is a short-range cruise missile (SRCM) fitted with a copy of the Czech PBS TJ100 turbo-jet engine.<sup>271</sup> Although the Houthis displayed the missile in July 2019, its high quality suggested that it was produced outside Yemen, most likely in Iran.<sup>272</sup> Moreover, the range of the missile is shorter than the distance from Yemen to Abqaiq, which also indicated that the attack was not launched from Yemen. The Saudi Defense ministry spokesman Col. Turki Al-Malki said, in a media conference, that seven cruise missiles had been launched at Abqaiq and Khurais. Four missiles struck the Khurais

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<sup>266</sup> Nadimi.

<sup>267</sup> Nadimi.

<sup>268</sup> Nadimi.

<sup>269</sup> Nadimi.

<sup>270</sup> Nadimi.

<sup>271</sup> "Attack on Saudi Oil Facilities Deepens Regional Malaise," *Jane's*, October 9, 2019, [https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG\\_2410772-JIR](https://customer-janes-com.libproxy.nps.edu/Janes/Display/FG_2410772-JIR).

<sup>272</sup> Nadimi, "The UN Exposes Houthi Reliance on Iranian Weapons."

oilfield and the other three fell short of Abqaiq.<sup>273</sup> Col. Al-Malki also said that the missiles had all come from a northerly direction.<sup>274</sup> The direction of the attack indicates that the attack was not launched from Yemen. The attack is more likely to have been conducted from the Arabian Gulf or the IRGC base. The Abqaiq investigation panel examined parts seized by the U.S. Navy from a flagless dhow in the Arabian Sea on November 25, which found several weapons including a Quds-1 missile with a computer terminal keyboard in Farsi.<sup>275</sup> Furthermore, according to fragments of the weapon found at the attack site and items seized during the November dhow interdiction, the panel concluded that the drone used for the strike had a maximum range of 540 to 900 kilometers, and the cruise missile 700 to 800 kilometers.<sup>276</sup>

Therefore, the panel argued that the trajectory and the range information from the incident contradicted the Houthis' claim of responsibility. The U.N. team asserted that the attack on Abqaiq came from the North/Northwest, while the Khurais attack came from the North/Northeast.<sup>277</sup> Moreover, according to a Western intelligence source, some craft flew over Iraq and Kuwait before striking the Saudi oil facility.<sup>278</sup> These data indicate that the attack's location is far away from the Houthi-held territory. According to the report, the attack could have been launched from anywhere with a 300 kilometer radius inside Saudi Arabia, across the Arabian Gulf—whether from the IRGC base near the port of Dayyer, from Farsi Island, or from a modified semi-submersible.<sup>279</sup>

Accordingly, the attack could not have been launched from Yemen due to the maximum ranges of the drones and missiles used as well as the complexity of these

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<sup>273</sup> “Saudi Arabia Oil Attacks: Weapons Debris ‘Proves Iran behind Them,’” BBC, September 18, 2019, <https://www.bbc.com/news/world-middle-east-49746645>.

<sup>274</sup> “Saudi Arabia Oil Attacks: Weapons Debris ‘Proves Iran behind Them.’”

<sup>275</sup> Nadimi, “The UN Exposes Houthi Reliance on Iranian Weapons.”

<sup>276</sup> Nadimi.

<sup>277</sup> Nadimi.

<sup>278</sup> “How Iran’s Generals Planned the Saudi Aramco Attack,” *The National*, November 20, 2019, <https://www.thenational.ae/world/mena/how-iran-s-generals-planned-the-saudi-aramco-attack-1.942609>.

<sup>279</sup> Nadimi, “The UN Exposes Houthi Reliance on Iranian Weapons.”

weapons, which make them unlikely to have been produced by the Houthi insurgents. The panel confirmed that Iran violated the international embargo by supplying the Houthis, who are still able to obtain parts that could be used to manufacture missiles and drones.<sup>280</sup> The Houthis' capability, however, is limited to ranges shorter than the range to Saudi's oil plant in Abqaiq.

Thus, the Abqaiq incident was most likely planned and executed by Iran or its clients in Iraq. The incident is one of several cases that indicate the Iranian intention to disrupt oil output in the Gulf area. According to a report by the American Enterprise Institute, the attack could have been aimed to pressure the GCC states and Europeans to "break with Washington and cut deals with Iran."<sup>281</sup> Iran's attacks on ships in the Arabian Gulf and Gulf of Oman, strikes against oil facilities, and attacks on U.S. interests in the region form a pattern in Iran's military response to the U.S. sanctions.<sup>282</sup> Another presumed motivation behind the attack was an Iranian intention to send a message to Tel Aviv regarding the nation's strength and capabilities.<sup>283</sup> The message also includes Iran's willingness to escalate without engaging in an open and direct confrontation with Israel.<sup>284</sup> Hence, the Aramco case shed light on the Iranian objectives in threatening the Gulf oil industry. The attack was a likely consequence of U.S.-Iran tensions. According to a Congressional Research Service report, rising U.S.-Iran tensions have led to several attacks on Gulf oil installations perpetrated or supported by Iran.<sup>285</sup>

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<sup>280</sup> Nadimi.

<sup>281</sup> Frederick W. Kagan, "Attribution, Intent, and Response in the Abqaiq Attack," American Enterprise Institute, September 2019, 7, [https://www.criticalthreats.org/wp-content/uploads/2019/10/RPT-Kagan\\_Attribution-Intent-and-Response-3.pdf](https://www.criticalthreats.org/wp-content/uploads/2019/10/RPT-Kagan_Attribution-Intent-and-Response-3.pdf).

<sup>282</sup> Kagan, "Attribution, Intent, and Response in the Abqaiq Attack," 7.

<sup>283</sup> Kagan, 10.

<sup>284</sup> Kagan, 9.

<sup>285</sup> Ratner, Blanchard, and Greenley, *Attacks on Saudi Oil Facilities: Effects and Responses*.

## **B. CONCLUSION**

In conclusion, the cases offered in this chapter present the Iranian pattern of threatening the oil shipping and infrastructure in the Gulf region. The investigations performed after each case, and the remaining parts of the weapons used, indicate that Iran had a hand in the attacks. Iran is known to leave fingerprints behind any attack or suspicious operations. Based on incidents discussed in the chapter, it is obvious that there are similarities in the methods and weapons used in these attacks, particularly in the damage caused, fragments found, or even Farsi logos or writing. For instance, the holes in the oil tankers caused by the explosive in the Al Fujairah incident are very similar to those in the Gulf of Oman attack on June 13. The investigations carried out after both incidents, to explore the case in detail and examine evidence in depth, asserted that limpet mines were used in the attack. Also, the debris from missiles used in the Abqaiq attack was identical to parts founded at the Shaybah oil plant, which was hit a month earlier. These wreckages contained parts identical to those used in Iranian-made weapons and drones.

Additionally, in each case, the perpetrator followed almost the same tactics, for example, the covert operation used in each attack, and attacked a similar target. Furthermore, the victim in every case was either an oil tanker or oil installation. The targets' similarity is evidence that the offender is the same. According to the previously examined incidents, all signs indicate that Iran or its proxies are guilty.

The attacks on several oil tankers and oil infrastructures in the GCC region show the Iranians are very likely the aggressors toward the civilian vessels. In addition, it reveals the tactics and methods Iran uses in threatening motor vessels and oil installations in the Arabian Gulf and the Gulf of Oman area. Additionally, the aggressions demonstrate the potential targets for Iranian offensive operations. They also reveal Iran's hostile ambitions toward the Gulf oil market. The Iranian attacks also aimed to show that nation's missile and drone capabilities. Iran was sought to take advantage of increased oil prices due to the attacks on oil output in the Gulf region. For instance, the attack on the Saudi oil plants in Abqaiq disrupted Saudi oil production that led to a 5 percent reduction

in the global oil supply.<sup>286</sup> The decline in oil supply increases oil prices only temporarily. Thus, Iran did not much benefit from that increase.

Iran depends on its cruise missiles and UAV inventories to attack regional oil platforms. The missiles are accurate and have high destructive power. Additionally, Iran manufactures different kinds of missiles and delivers them to its proxies in the region. The missiles, too, can be launched from different platforms and locations. Additionally, some varieties of missiles can fly at low altitudes, making them difficult to detect and destroy. Iran also relies on its UAV technology. The risk of such technology lies in its accuracy enabled by a sophisticated camera that facilitates the control of the drone to precisely hit the target. Moreover, these drones are capable of carrying a high explosive charges that can cause serious casualties. At the same time, the drone systems are simple and relatively cheap to produce, which makes them very easy to manufacture and use. Indeed, drone systems could be a modification from commercial production. Furthermore, Iran recently has used Yemen land as a testing ground for its weapon systems innovations. Iran also deploys its IRGC for clandestine attack missions against oil facilities in the GCC area.

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<sup>286</sup> Ratner, Blanchard, and Greenley.



Figure 2. Saudi Arabia’s Recently Attacked Oil Fields<sup>287</sup>

<sup>287</sup>Adapted from Science Direct, “Modelling Residential Electricity Demand in the GCC Countries,” Accessed on October 25, 2020, <https://www-sciencedirect-com.libproxy.nps.edu/science/article/pii/S0140988316301992>.

## IV. CONCLUSION

Oil is a crucial resource for the Gulf states and many countries in the world, and the Gulf region is the major international oil distributor. After Iran's revolution in 1979, the tension between Tehran and its Gulf neighbors increased, making oil a potential target for inter-state aggression. Oil production and distribution was targeted by both sides during the Iran-Iraq War, and more recently Iran has been accused of several attacks on oil shipping and facilities in the Gulf area in response to Gulf support for U.S. sanctions against Iran. Iran also supports, trains, and arms several militias and proxies in the wider Gulf region. Hence, the Iranian threat to the Gulf oil sector is apparent. Through case studies, this thesis has examined Iran's ability, willingness, and methods to carry out its threats to Gulf oil output. Understanding Iran's capabilities can help to determine that country's ability to attack Gulf oil interests and the level of destruction from such an attack, while the case studies introduce real examples that improve that understanding and provide practical proof of the likelihood of such attacks in the future.

Iran's capabilities are represented in its military forces (the Artesh), which is composed of 418,000 active duty personnel;<sup>288</sup> however, the most threatening branch is the IRGC. Having the Gulf of Oman area as its primary responsibility, the Artesh navy poses a low threat to the Gulf oil sector. The IRGC consists of 130,000 active duty personnel<sup>289</sup> and is responsible for the Gulf region and the Strait of Hormuz. Because the IRGC has established several locations on islands close to the Gulf countries, it appears poised to use those locations to launch attacks against Gulf countries' oil output. Some locations, such as Basatin, Dayyer, Farsiyah, Abu Musa, and Qeshm, present a higher threat than other island bases due to their proximity to Gulf states and the SOH. Moreover, the IRGC also commands and directs regional proxies, such as the Houthi rebels, to attack Gulf oil facilities. Thus, the IRGC poses a high threat to the production and distribution of oil in the Gulf area.

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<sup>288</sup> Jane's, "Iran Armed Forces."

<sup>289</sup> Jane's.

The IRGC possesses numerous air and marine vessels fitted with cruise missiles, machine guns, and mines that could threaten the oil installations in the Gulf region. Iran's naval assets can be used to disrupt shipping of oil in the Gulf and SOH areas. For attacks from varying ranges, Iran depends on its highly accurate and lethal missiles that present a significant threat to neighboring states. Additionally, the IRGC operates several types of UAVs capable of reaching long distances for C4ISR operations and to deliver Iran's missiles. The UAV systems are very accurate and can cause significant damages. Moreover, drones are low-cost and easy to manufacture locally. Accordingly, Iran's expanding drone inventory presents a high threat to regional oil installations.

The research examined for this paper focused on several recent incidents that indicate the Iran's ability to threaten or disrupt the shipping of oil in the Gulf region is limited. Moreover, they reveal Iranian tactics and course of action to attack the oil sector in the GCC region. As previously discussed, for example, the sabotage attacks on oil tankers in the vicinity of Al Fujairah on May 12, 2019, and in the Gulf of Oman on June 13, 2019, indicate Iran's maneuvers and approaches to disrupt shipping at anchorage zones. Additionally, recent cases reveal the Iranian means and weapons used for the aggressions. The attacks were performed through covert operations and most likely were conducted at night. Although Iran has denied its involvement in the aforementioned attacks, both attacks were similar in procedure and material used, indicating the same actor. The Iran's secrecy following both attacks and its denial of any responsibility for the action may indicate Tehran's fear of a reaction from the international community. Furthermore, this secrecy reflects Iran's inability to pursue direct confrontation.

The Shaybah oilfield attack shows the role of Iran's proxies in the region and their significant contribution to the battle on oil industries in the Gulf states. Furthermore, the incident reveals the drone systems' capability and the long ranges they can reach. The risk of these UAVs lies in their ability to carry a high amount of explosives that could cause significant damage. Moreover, most types of drones can be controlled through a high-performance camera that improves the hit probability and increases the precision of the attack. Nevertheless, the Abqaiq and Khurais attacks show Iran's limited capabilities in carrying out such strikes on the Gulf's oil installations. Specifically, the incident



emphasizes Iran's reliance on its short-range missiles and UAV systems to perform attacks on land oil infrastructures in the Gulf area. Furthermore, the incident illustrates the significance of these missiles, especially as their accuracy and destructive power improves, which can cause remarkable damage.

The main question addressed by this thesis is: does Iran threaten the Arabian Gulf oil output? Three hypotheses were tested to address the thesis question: Iran poses a low-level threat, a moderate-level threat, or a high-level threat to the Gulf oil output. Based on the analysis presented, the categories of low and high threat are largely unsupported. The low-level threat hypothesis is most unlikely. As described, Iran possesses a variety of missiles with different ranges and detonation power. Although Iran's missiles are locally made and lack high performance, they can cause considerable damage and cannot be neglected. Moreover, Iran's missiles can be launched from land platforms, submarines, patrol craft, and even small boats, making them versatile and effective weapons.

Iran also produces several types of sea mines and UAV systems. Such weapons could cause damage to and interruptions in regional oil output as shown in recent incidents. Moreover, Tehran provides its regional proxies with Iranian made missiles. These groups present a potential threat to the Gulf countries despite their lack of experience and the primitive technology they use. Missiles seized or otherwise acquired by these proxies pose a threat to oil production in the Gulf. The variety of weapon systems and number of proxies within the region make the low-threat level hypothesis irrational.

The high-level threat hypothesis is also unlikely. Iran's economic decline hinders the nation from developing its military arsenal or buying more weapons. The economic dilemma similarly restrains Iran's support to its clients in the region. Additionally, budget constraints prevent Tehran from buying more advanced weapons that could pose a high threat to the region. Moreover, Iran lacks access to the global military technology market. The sanctions imposed on Iran prevent Tehran from purchasing updated military products from the global market and compel that country to rely on local manufacturing, which is rudimentary and lacks robust production capability.

The presence of the U.S. forces in the Gulf region, to protect critical oil resources, is also an important factor that reduces Tehran's threat to regional oil output. The U.S. troops in the Gulf area deter Iran from critical aggression directed at the oil industry in the Gulf countries. Moreover, the American Navy patrolling in the Gulf waters diminishes IRGCN threats to oil tankers sailing throughout the area. Additionally, U.S. surveillance and scouting aircraft are tracking Iranian movements in the Arabian Gulf and SOH area. Such Combat Air Patrol (CAP) minimizes Iran's threat to Gulf countries and navigation in the Gulf's waters. These efforts are further enhanced by the U.S. intelligence service, which gathers information on Iranian behavior and intentions within the region. Such vital information helps reduce Iran's threat to Gulf states. Thus, the U.S. presence in the Gulf prevents any significant threat from Iran to the region.

Moreover, Iran lacks the requisite advanced military, power projection capabilities, and sophisticated air and air defense forces to carry out a devastating attack. The air force is the first line for attacking enemies or defending nations, but Iran's air force is ailing. Most of their planes are either grounded or obsolete and could not compete with the air forces of other Gulf countries. This disadvantage is exacerbated by Iran's fragile economy that limits Tehran's access to the global defense market. That fact coupled with a rudimentary military reduces the likelihood of high threat from Iran.

Additionally, Iran faces internal security crises and divisions that restrict the nation's external operations. Many Iranian citizens are suffering from poverty and unemployment. Tehran has experienced several rebellions and uprisings during the past decade. These internal issues challenge the regime and undermine Iran's ability to severely threaten oil production in other Gulf countries. The recent U.S. sanctions on Iran also hinder the country's capability to pose a high threat to neighboring states. Thus, Iran's threat to the oil sector in the Gulf region is unlikely to rise to a high threat level.

Therefore, this analysis shows that Iran most likely poses a moderate threat level. The information and cases discussed in the paper support this hypothesis. Iran imports and manufactures a large number of missiles. Yet, Iran's missiles are of low performance and in limited supply. As discussed, Iran is heavily reliant on domestically produced missiles, but it lacks professional manufacturing capability of this type. Consequently,

most of Iran's missiles are outdated and undeveloped. The threat from such missiles is undermined by their low performance. As a result, Iran's missiles could likely present a moderate threat.

Moreover, Iran understands the risk of direct engagement with the regional countries, so it launches attacks through a network of regional proxies. These proxies are unable to pose a high threat due to their lack of advanced weapons and adequate training. Additionally, the Gulf states in general, and Saudi Arabia in particular, operate many oil fields distributed among several locations. The redundancies of oil installations scattered among thousands of square miles diminish the probability of a major threat. Furthermore, most Gulf countries deploy high performance and advanced missile defense systems that are capable of intercepting any missile and drone attacks orchestrated by Iran through its proxies. The majority of vital oil installations in the Gulf countries are protected by effective anti-air defense batteries to intercept airstrikes. Such systems minimize the Iranian threat to the oil facilities.

As oil is a global commodity that represents the primary energy source for many countries, Iran has long realized the significance of oil to international society. Accordingly, Iran is very cautious in its war against oil exports in the Gulf area, and Tehran is unlikely to pose a significant threat to the Gulf's oil infrastructure out of fear of the expected violent response from the international community, including Iran's friends. Additionally, any instability in the oil market in the region will have negative consequences on Tehran as an oil exporter country. Thus, Iran is unlikely to seriously threaten Gulf oil production.

According to the case studies discussed earlier in the thesis, the attacks on oil tankers off Al Fujairah and the Gulf of Oman demonstrate the level of Iran's threat to oil shipping in the region. The sabotage attack resulted in small size holes in the vessel's hull. The damage was not critical and the attacks did not disrupt the oil market. According to the U.S. Energy Department, the oil markets remained at a stable supply.<sup>290</sup>

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<sup>290</sup> Jon Gambrell, "Tankers Reported Damaged off UAE on Major Oil Trade Route," AP News, May 13, 2019, <https://apnews.com/article/3884ea5ef0084d7a9e8a7d48c03fb69e>.

Rather than having much physical impact, the attack had a psychological one. The attacks illustrated that Tehran is capable of attacking oil shipping in the region despite the limited damage from these attacks. The incidents also showed that the Iranian threat to regional oil output is a most likely moderate one.

Turning to land-based oil facilities, the attack on the Shaybah oil field caused a fire and some damage to a few parts in the plant, including processing and cogeneration units. Nevertheless, no human injuries were reported and plant operations were restored in two weeks. Moreover, Saudi Arabia's Aramco continued providing its customers with oil supplies from alternative oil facilities. The Abqaiq attack, likewise, resulted in a small fire that was controlled within the same night. Although 54 percent of the crude oil supply was temporarily suspended by the attack, oil production resumed within 11 days and the impact on oil markets proved insignificant. While the outcomes of these attacks were insignificant, Iran demonstrated its determination and ability to reach and attack oil facilities of other Gulf countries and to achieve limited or temporary damage. Accordingly, Iran's threat to oil infrastructure in the Gulf region is moderate.

In conclusion, Iran's threat to Gulf oil output is moderate. In terms of capability, the research showed that Iran develops a variety of weapon systems, including missiles and mines. Yet, as the research also showed, Iran is unlikely to employ its arsenal through direct confrontation. It prefers covert methods and is often assisted by a few regional proxies. Overall, Iran faces several constraints that contain its threat level, such as its rudimentary weapon systems, aged military equipment, declining economy, U.S. sanctions, U.S. presence in the region, and internal security crises. Nevertheless, Iran's oil producing neighbors in the Gulf should take steps to improve their anti-air capabilities and maintain advanced air defense systems to deter any future Iranian aggression. Sophisticated anti-air systems could prevent Iran's threat to Gulf oil installations. Additionally, Gulf countries should strengthen and expand their naval forces with additional fast patrol boats and vessels with updated command and control systems. Moreover, these countries should enhance their maritime coordination to prevent further attacks on merchant shipping in the Arabian Gulf and the Gulf of Oman.

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