Derelict Vessels and Ship Disposal in Washington State: Opportunities and Constraints

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Abstract

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Abandoned and derelict vessels constitute a serious environmental threat to the waterways of Washington State. Although the Department of Natural Resources (DNR) leads removal efforts through its Derelict Vessel Removal Program, the agency is ill equipped to deal with large steel vessels over 65 feet long. This paper uses a policy analysis method to explore the possibility of a facility in Washington State dedicated to the safe remediation and disposal of these larger derelict vessels, in the context of other possible alternatives. The main issues that accompany derelict vessels are first explored in depth. The pros and cons of such a facility are then weighed and the key considerations in the feasibility of a facility are drawn out, all with the conditions that would define a successful policy choice in mind. The extraction of these factors of feasibility leads to the conclusion that the a facility as visualized is unlikely to be able to clear the many hurdles it faces, and only an aggressive attempt at a partnership with existing shipyards is likely to succeed.

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1 - Introduction

Marine debris is one of the lesser known and least visible forms of aquatic pollution. The National Oceanic and Atmospheric Administration (NOAA), the primary federal agency tasked with dealing with the problem, defines marine debris as "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes."[1] This definition typically includes plastics, glass, metal, rubber, and other materials that do not biodegrade when they are left in the ocean. NOAA's definition also includes fishing gear that was lost or abandoned in the marine environment, as well as abandoned and derelict vessels.

This final type of marine debris, known as ADVs for short, is an often overlooked aspect of the environmental problem. According to NOAA, "ADVs threaten our oceans, coast, and waterways by obstructing navigational channels, causing harm to the environment, and diminishing commercial and recreational activities."[2] Often owners simply cannot pay for the continued maintenance of the vessel, so the boat is left to deteriorate in a marina. Vessels sometimes break anchor and begin drifting, destined to remain wherever they beach. Boats are often simply dumped in state waters, left for the government to take responsibility. These vessels often are extremely old, and contain hazardous materials such as PCBs, asbestos, and leftover fuel oil.[3] As mentioned above, ADVs can pose a hazard to operational vessels in navigational channels, marinas, and harbors. They also can simply be an eyesore, discouraging

[1] National Oceanic and Atmospheric Administration, "Marine Debris Program - Who Are You?", n.d.
[2] *NOAA Marine Debris Program and Abandoned & Derelict Vessels*. National Oceanic and Atmospheric Administration, 2009.
[3] Maureen O'Hagan, 2012.

recreation in the immediate vicinity. The direct environmental impact, as well as the indirect social impacts can be extensive.

There are several regulatory programs at the Federal, state, and local levels that deal with abandoned vessels. Federally, there are three agencies with jurisdiction over ADVs. The primary Federal ADV program is NOAA's abandoned vessel project, which is located within the marine debris program and is coordinated by the Office of Response and Restoration. NOAA has conducted workshops to identify knowledge gaps, and regularly develops guidance for state programs and conducts field surveys documenting vessel removal efforts. Recently NOAA has managed to secure funds for active removals, particularly in coral reef habitats in the Pacific and Caribbean.[4] The United States Coast Guard has the authority to intervene with an ADV if the vessel poses a serious risk to federal navigation channels or to the environment.[5] However, this authority only extends to the removal of major pollutants onboard the vessels, or to simply move the vessel out of the channel; the Coast Guard cannot remove or dispose of the vessel except in rare instances.[6] The U.S. Army Corps of Engineers has the authority to remove "sunken or floating" debris, but only if that debris is posing a hazard in a federal navigation channel.[7] At the federal level, there is only a limited ability to deal with ADVs, and virtually no ability to dispose of them.

Without Federal assistance for vessel removals, states must handle their own derelict vessels. At the state level, there are several formal programs designed to address this

[4] National Oceanic and Atmospheric Administration, "NOAA Abandoned Vessel Program", 2011.
[5] Washington State Department of Natural Resources, "Derelict Vessel Background Information", 2013.
[6] Ibid.
[7] Ibid.

widespread problem, and as of 2009, 9 states had official ADV programs.[8] However, many of these programs have little to no dedicated funding, severely limiting the number of removals and disposals that can be conducted. As a result, many states must invoke a patchwork of state laws and provisions to initiate removal. Some states have passed laws that have never been used, and still other states have laws but simply do not enforce them.[9] Due to the fragmentation of authority at the Federal level, the states have been left to deal with the problem on their own with limited funding.

1.1 - Washington State Derelict Vessel Removal Program (DVRP)

Washington State has a derelict vessel program administered by the Department of Natural Resources (DNR), created in 2002 with the passing of the Derelict Vessel Act.[10] Under the legislation, certain "authorized public entities" have the authority to remove ADVs that are in their jurisdiction.[11] DNR facilitates and oversees those removal and disposal efforts, and can act as the authorized public entity if the regulatory authority with jurisdiction in that area chooses.[12] There is a process whereby DNR takes custody of an ADV, removes and disposes of it, then attempts to track down the owner or responsible party for reimbursement. The 2002 legislation also set up the Derelict Vessel Removal Account, which can be tapped if no funds can be recovered from the owner.[13]

As the lead state agency in dealing with ADVs in Washington State, DNR must first identify "vessels of concern", vessels that for one reason or another have caught the eye of the

[8] National Sea Grant Law Center, 2009.
[9] National Sea Grant Law Center, 2009.
[10] Washington State Department of Natural Resources, "Derelict Vessel Background Information", 2013.
[11] Ibid.
[12] Ibid.
[13] Washington State Department of Natural Resources, "Derelict Vessel Background Information", 2013.

agency.[14] Often these vessels reported to DNR by other agencies, entities, or even citizens. DNR maintains a list of these vessels sorted by removal priority, and this priority is determined by the vessel's condition, location, and the threat it poses to surrounding resources.[15] This priority is then used to direct funding for the actual removal. Naturally, this list is extremely fluid, as vessels disappear, are moved, or deteriorate further.

Once a vessel is identified and has reached the top of the removal priority list, the authorized public entity can apply for funding from DNR to remove it. If DNR is the authorized public entity, then the agency is free to conduct removal operations if there is funding for the project. DNR's budget for the 2011-13 biennium was $1,761,000.[16] This represents, quite simply, a budget appropriate for dealing with "typical" derelict vessels: small, recreational, and made of wooden or fiberglass.[17] These budget restrictions become problematic as the vessels to be removed become larger. In the fall of 2012, DNR used ten years of its program data to estimate the average cost of removing very large (those between 100-200 feet) versus smaller (<100 feet long) vessels – and found the per vessel cost of the larger-class disposals to be almost 50 times higher.[18] This statistic shows the vast disparity in cost DNR faces when attempting to remove and dispose of large vessels.

After a derelict vessel has been targeted for removal, the ownership is transferred to the authorized public entity, and if that entity chooses disposal, the vessel must be inspected and all hazardous substances must be treated and removed in an appropriate manner.

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[14] Washington State Department of Natural Resources, "Derelict Vessel Removal Program: Derelict Vessel Inventory & Reimbursement Priorities", 2013.
[15] Ibid.
[16] Washington State Department of Natural Resources, 2013.
[17] *2013 Legislative Proposal: A Policy Dialog*, 1.
[18] Todd Hass, Personal Communication, 2013.

Substances common in older vessels, such as PCBs and asbestos, are extremely expensive to handle and remove.[19] There are several Federal and state laws on the books, such as the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act (TSCA), that regulate the handling and disposal of toxic materials. These regulations limit the release of toxic materials to the environment, but compliance ends up being very costly. Every toxic material has its own handling, disposal, and worker safety rules, and following these rules represents a large portion of the total removal cost.

These costs become far greater when the vessel being removed is a large commercial ship. The cost of removing a single vessel over 65 feet has the potential of eclipsing the entire year's budget, and several recent incidents have made this reality painfully clear. In 2011, a former WWII Liberty ship was repossessed after being partially dismantled by its owner on the Washington side of the Columbia River.[20] Due to its condition, the vessel had to be scrapped in place, eventually costing nearly $22 million.[21] Despite the massive cost of removing this vessel, known as the *Davy Crockett*, the problems of derelict vessels did not come significantly into the public eye until the subsequent year. In 2012, a 140-foot former fishing boat that had been abandoned in Whidbey Island's Penn Cove caught fire and sank; by the time the *Deep Sea* had been pulled off the bottom and removed from the area, the entire operation cost $5.4 million.[22] DNR's derelict vessel budget simply was not, and still is not, equipped to deal with large commercial vessels. After the *Deep Sea* incident, the major problems with the budget were laid bare by the local media, and the issue entered into public awareness.

[19] *2013 Legislative Proposal: A Policy Dialog*, 2.
[20] Washington State Department of Ecology, 2013.
[21] Ibid.
[22] O'Hagan, 2012.

Despite the fact that the DNR's budget is not designed to deal with large vessels, a fair number of identified derelict vessels in Washington State are over 65 feet long. As of July 3, 2013, 28 out of 156 total vessels on the removal priority list were over 65 feet long, nearly 18%.[23] Naturally the larger vessels generally are higher priority for removal, as they represent a larger threat to the environment and property around them. As a result, using removal funds on large vessels takes away the department's capacity to remove the numerous smaller derelict vessels that are scattered across Washington State.[24]

Disposal of these large vessels is extremely problematic as well. Most wood and fiberglass vessels under a certain length can simply be loaded onto a trailer and put in a landfill.[25] However, for vessels over 65 feet (especially steel vessels), there are simply not very many good options for disposal. These disposals require a certain type of facility, one that is big enough and technologically advanced enough to accommodate these large vessels, as well as to handle potentially large amounts of hazardous waste in a safe manner. There are a limited number of appropriate facilities in Washington State, so acquiring their services can be difficult and expensive.[26] The cost of the actual dismantling work does not even take into account many other important aspects of any vessel disposal, including the cost of storage, moorage, and towage to the facility.[27] The costs can be high as there are many different aspects to a successful vessel disposal; however, these costs are far lower than the costs of disposal after the vessel has grounded or sank.

[23] Washington State Department of Natural Resources, 2013.
[24] *2013 Legislative Proposal: A Policy Dialog*, 1.
[25] Personal interview, 2013.
[26] Ibid.
[27] Hess, 21.

In Washington State, the only established facilities (with the exception of the Puget Sound Naval Shipyard) that have the ability to dismantle a large vessel are commercial shipyards.[28] However, for many reasons, commercial shipyards are not significantly involved in either DNR's derelict vessel disposal efforts, or in the domestic ship scrapping industry. Ship disposal is generally a "dirty" enterprise in comparison to ship repair and construction.[29] This is largely because of the quantities of scrap materials and toxics that are created. Under the RCRA, facilities that generate hazardous waste are grouped into different categories based on the quantities of waste they generate.[30] Each category has progressively more stringent toxic material handling and reporting requirements.[31] Commercial shipyard operations generate quantities of waste to begin with; taking on a vessel disposal job would generate more waste, waste that would count against their RCRA number.[32] The Environmental Protection Agency (EPA), via the state Department of Ecology, has recently begun to develop a general vessel deconstruction permit to better allow for these types of necessary activities.[33] However, until this permit can be developed to streamline the process, it is generally not in the interest for shipyards to take DNR's derelict vessel scrapping jobs unless the contract price is quite high.[34] Finally, since the profit margin of scrapping a vessel is so minimal, most shipyards would rather use their precious drydock space for a newbuild vessel or a yacht conversion, jobs that typically will bring in far more money.[35]

[28] Personal interview, 2013.
[29] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, F-2.
[30] *2011 National Hazardous Waste Biennial Report*, I-2.
[31] Personal interview, 2013.
[32] Ibid.
[33] Environmental Protection Agency, 2013.
[34] Personal interview, 2013.
[35] Ibid.

The lack of sustained funding for the DVRP has also affected compliance and enforcement of existing vessel registration and property statutes. According to DNR, an estimated 25% of Washington's recreational boats are not registered.[36] This represents an enormous loss of revenue that could be collected for state funding. This also potentially becomes a self-fulfilling prophecy, in that the state simply does not have enough funding to hire compliance officers to make sure that registration fees are paid, and to make sure boats are not abandoned in state waters.

Washington State's efforts to address the ADV problem have been further bolstered by recent legislation signed into law (effective July 28, 2013), known as ESHB 1245. This state law provides DNR with added tools to deal with the problem, such as the creation of a voluntary vessel turn-in program, additional vessel registration fees to cover eventual disposal, and the creation of a workgroup to explore the viability of a state scrapping program.[37] These efforts are significant steps towards finding a solution to many aspects of the problem, particularly with respect to funding. However, the new law does nothing to remedy the disposal issue directly. The attempt to alter public incentives is helpful using a turn-in program, but does not give DNR any more ways to dispose of large vessels even if they are turned over to the state. Similarly, the leveling of new fees to pay for eventual disposal may help to reduce the overall cost burden, but DNR must still rely on private shipyards to dispose of large vessels at their discretion. Still, the derelict vessel law shows the willingness on the part of the Legislature to begin to address a complex problem.

[36] *2013 Legislative Proposal: A Policy Dialog*, 3.
[37] Access Washington, 2013.

1.2 - Environmental Problems

Many of the problems DNR faces in their efforts to identify, remove, and dispose of derelict vessels are related to the environmental concerns that accompany most if not all ADVs. These concerns are often far more complex and dangerous in a large vessel, compared to a smaller one. For example, ships require a wide variety of synthetic material and liquids to ensure their effective operation, and in general, the larger the vessels, the more of these materials are present. These materials are often extremely toxic, and their release into the aquatic environment constitutes a major threat to the health of humans and animals alike. When vessels are abandoned, they will eventually pose a hazard to sink or run aground, necessitating their removal.

Virtually every vessel on the water, no matter what size or hull material, contains some type of oil. Small vessels can contain lubricating oils as well as light fuel oils, like gasoline.[38] Larger vessels will often contain these types of oil as well, along with progressively heavier types of fuel oil. The largest vessels must run on Bunker C fuel oil, which has as extremely low viscosity and therefore can be difficult to remove from the environment.[39] Vessels that burn these heavier forms of refined oil also produce large amounts of sludge oil, which in Bunker C can represent as much as 5% of the total volume of the fuel.[40] Sludge oil will not burn in combustion, and therefore must be disposed of in some other manner.[41] As a result, if a derelict vessel burns (or burned) heavy fuel oil for propulsion, there may be large quantities of sludge oil present in the vessel.

[38] Norton and Renoud, 1081.
[39] *Oil in the Sea*, 114.
[40] *Oil in the Sea*, 83.
[41] Ibid.

The impacts of oil released in the marine environment are part of what makes the threat of derelict vessels so pressing. Once oil enters the aquatic environment, it begins to undergo a series of physical, biological, and chemical processes which change its makeup.[42] Different types of oil change in different ways, and their effects on the environment vary. Organisms that have fur or feathers are affected by direct contact with oil, often destroying the "insulation value" of these outer coats and causing hypothermia.[43] Birds and other mammals that use the water surface can be smothered by lingering oil, and direct ingestion can be chronically toxic or even lethal.[44] Fish can also ingest oil, creating a litany of nonlethal afflictions such as altered heartbeat, enlarged livers, and severe reproductive impairment.[45]

Although oil is the most obvious among the toxins contained within vessels, polychlorinated biphenyls (PCBs) are perhaps the most toxic. PCBs are synthetic substances that were produced for a variety of uses until 1979, when their manufacture was banned internationally.[46] Due to their terrific properties of chemical stability, insulation, and non-flammability, PCBs were used extensively in the construction of marine vessels of all sizes before 1979, and can be found in hydraulic systems, electrical equipment, thermal insulation, and even oil-based paint.[47] PCBs have been shown to cause various types of cancer in animals, and because they typically stay in the environment for long periods of time, PCBs can pose a cascading threat to many different parts of the ecosystem.[48] Once PCBs are released into the

[42] *Oil in the Sea*, 89.
[43] Congressional Digest, 171.
[44] Congressional Digest, 171.
[45] Ibid.
[46] "Basic Information: PCB." Environmental Protection Agency, 2013.
[47] Ibid.
[48] "Health Effects of PCBs." Environmental Protection Agency, 2013.

environment through the grounding or sinking of a derelict vessel, it could take years for the area around that vessel to recover.

Another highly toxic material that is frequently found in vessels of all types is asbestos. Asbestos is a mineral fiber that, due to its heat resistance, has been used as insulation and as a fire retardant in many aspects of construction and heavy industry.[49] On a ship, this material can be found in everything from adhesives, tiles, and gaskets, to heat shields and wire insulation.[50] Asbestos fibers are usually inhaled though the air during removal, and can cause severe health problem in humans; the effect on wildlife is unknown.[51] This material, along with a litany of other toxic substances, makes the removal and disposal of derelict vessels an extremely dangerous enterprise. As a result, the environmental problems associated with ADVs constitute a huge challenge for DNR in their derelict vessel removal efforts.

1.3 - Economic Problems

Another problem with large derelict vessels exists in the economic realm. Derelict vessels are essentially a negative externality caused by a market failure. Transactions within the market for used vessels often involve owners who do not have the means to take care of the vessels they purchase; repeated sales of a vessel typically occur at lower and lower prices as the vessel becomes more and more of an environmental liability.[52] As a result, they become trapped in a cycle of declining vessel value, and the rapid loss of ability to pay for maintenance causes the sale of the vessels to progressively less scrupulous owners, until the final owner

[49] "Learn About Asbestos." Environmental Protection Agency, 2013.
[50] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, 13.
[51] "Learn About Asbestos." Environmental Protection Agency, 2013.
[52] *2013 Legislative Proposal: A Policy Dialog*, 2.

cannot afford to even sell the vessel, and it becomes abandoned.[53] This downward spiral of ownership and neglect results in a negative environmental and social externality, as these ADVs potentially impose higher costs upon others who are not involved in the used vessel market.

The situation is further complicated by the failure of the state and local governments to effectively deal with ADVs. The reasons for this government failure are several (and are related above), but the inability on the government's part to remove these vessels once they are abandoned, or to take action against owners when vessels are on the brink of abandonment, consistently compounds the externality problem. The costs of removing and disposing of the ADVs, which should be the responsibility of the final vessel owner (or alternatively, borne/offset by the vessels owners over the course of the vessel's commercial life), eventually ends up with the government, a classic case of cost shifting. In other words, as vessels become cheaper and cheaper on the market, their potential negative externality grows. When they finally do become abandoned or derelict, this cost is borne directly by the government. The economic problems of ADVs add a further complication to the environmental problems addressed above.

In total, DNR faces several key problems that must be addressed. The first is the litany of environmental threats that ADVs pose, from asbestos to PCBs. No matter how DNR chooses to attack the derelict vessel problem, these threats must be reduced or eliminated. Secondly, DNR simply does not have enough money to carry out removals and disposals, as virtually every step incurs high costs. However, the agency is compelled to act, since there is an extremely high opportunity cost associated with deferring the problem. The third major problem is that there

[53] *2013 Legislative Proposal: A Policy Dialog*, 2.

are no good ways for DNR to dispose of large vessels. The cost is usually far too high, since disposing of a vessel "correctly" requires a certain type of specialized facility. Finally, there is a private economic incentive to abandon old used vessels, since abandonment is far cheaper than the cost of ongoing maintenance or the cost of proper disposal. This final problem compounds an already complex issue that DNR must face.

There are several options DNR could examine in pursuit of an answer to these problems. This thesis will examine in depth one of the primary alternatives, namely the creation of a facility in Washington State to dispose of the derelict vessels that are removed. This particular alternative will be compared with the others to see if it appears to be the most feasible given the current legislative environment. From there, the facility alternative will be explored in depth to determine the conditions that would affect its feasibility, and to see whether the serious problems identified above could be alleviated or solved. Finally, a conclusion will be drawn about the overall feasibility of the alternative, and recommendations will be made about the best way for DNR to go forward.

2 - Alternatives

2.1 - Status Quo

There are a range of alternatives DNR could pursue to address these problems. First, the agency could simply do nothing, and accept the status quo. This would mean that funding would be achieved primarily through future legislative means, much in the same way ESHB 1245 raised the DVRP's budget. The environmental issues identified would continue to persist, and DNR would be forced to continue to look to private shipyards for the disposal of their removed derelict vessels. This alternative would be extremely expensive, and would not reduce the tendency of financially strapped owners to simply ditch old vessels. This status quo represents the conditions under which the DVRP have been operating since its founding, and is extremely undesirable considering the threats derelict vessels pose to the public and to the environment.

2.2 - Artificial Reefing

The second alternative DNR could pursue would be to create or participate in an artificial reefing program, whereby derelict vessels are towed to certain locations and sunk to provide some sort of ecological benefit to that ecosystem. The appropriate location would be determined by the amount of benefit such a vessel could provide to the habitat and structure of a submerged ecosystem. There is general acceptance among the scientific community that steel vessels that have been extensively cleaned before sinking can provide excellent habitat for species living in sandy or mud bottom coastal areas.[54] There is a certain amount of precedent related to this alternative, as several states have explored and implemented artificial reefing

[54] Hess, 61.

programs in their coastal areas.[55] Additionally, the US Navy has used their SINKEX program to add to artificial reefs, using the vessels as target practice for an added benefit.[56]

However, the artificial reef alternative cannot be seen as a viable alternative for several reasons, all relating to cost and environmental hazards. In 2001, Ronald Hess of the Rand Corporation conducted an examination of artificial reefing as an alternative for ship disposal, and eventually came to the conclusion that an annual budget of $10-25 million was needed to administer and conduct an artificial reefing program.[57] DNR simply does not have access to this kind of money, and could not hope to support such a program. Additionally, the Navy SINKEX program was shut down in September 2012 after a report conducted by the Florida Fish and Wildlife Conservation Commission on the SINKEX vessel USS Oriskany (sunk in 2006) revealed that extensive bioaccumulation of PCBs had occurred, and had caused negative effects in the marine food chain.[58] In order to avoid this type of negative effect and to comply with current environmental laws, the vessel first must be extensively cleaned and abated in drydock before sinking.[59] Once the vessel is in drydock, it makes no sense to float it again just to sink it; disposing of it in drydock may very well be more cost effective. Artificial reefing may be viable on a single vessel basis in special ecological circumstances, but for DNR's purposes, the alternative should not be counted on.

2.3 - Overseas Recycling

The third alternative DNR may examine is overseas recycling, also known as "shipbreaking". This is a practice that many foreign flagged shipping companies are involved in

[55] Hess, 63.
[56] Hess, 70.
[57] Hess, 79.
[58] Basel Action Network, 2012.
[59] Hess, 66.

when their vessels become too old, and in 2012, over 1000 vessels were scrapped worldwide.[60] The term "shipbreaking" refers to the process whereby large vessels that have reached the end of their operational lifetime are broken down into scrap material.[61] Over 90% of world trade is carried by ship,[62] and as of January 2011, there were 103,392 seagoing commercial ships in service.[63] Merchant vessels typically last 30 to 40 years depending on their type, after which point any renovations or repairs make no economic sense.[64] Once vessels reach this point, owners must find a way to dispose of them.

Although there are numerous methods for disposing of old vessels internationally, 70 to 80% are grounded upon sandy beaches in Bangladesh, India, and Pakistan, where they are taken apart one steel piece at a time.[65] There are numerous problems with this practice which make it the subject of international attention. Taking apart a ship on a beach means that there is no containment for residual fuel oil or dirty bilge water, and these pollutants typically are absorbed into the sand and eventually washed back into the ocean.[66] The environmental health of these particular areas has undergone a startling visible decline. The health of the workers involved is also a serious concern. Workers are regularly exposed to PCBs and asbestos that were used in the ships' construction, and fatalities due to falling steel, exploding gases, and lack of safety gear are commonplace.[67] Child labor is also a problem, with around 1 in 5 workers

[60] Hulsen et al., 2013.
[61] Sarraf, 1.
[62] "Introduction to IMO", International Maritime Organization.
[63] "Review of Maritime Transport 2011", 36.
[64] Sarraf, 9.
[65] Tejada-Linde, 5.
[66] Ibid.
[67] International Labour Organization, n.p.

being under the age of 15.[68] Despite these issues, it is largely economics that drive the choice of beach shipbreaking, as it is significantly cheaper than using environmental facilities elsewhere in the world.[69]

Shipbreaking as an industry has not existed in any large scale in the United States since the early 1980's.[70] Increased environmental and safety regulations, as well as the erratic scrap metal market contributed to the migration of the ship recycling industry overseas.[71] In subsequent years, scrapping operations continued in Korea and Taiwan, but gradually moved east to India, Bangladesh, and Pakistan, where the industry primarily resides today.[72] There are very few environmental, labor, and safety laws in these places, and in the decentralized shipping industry, it is extremely easy for shipping companies to unload their obsolete vessels well under the radar.

Perhaps the most critical aspect of the international shipbreaking industry is its distinct connection to global economic troubles. When the global economy is thriving, merchant vessels are in high demand, as more businesses look to move their products.[73] In times of economic hardship, shipbreaking enterprises in places like Alang, India and Chittagong, Bangladesh flourish, as global shippers look to unload their excess shipping capacity.[74] As a result of these unique characteristics, the shipbreaking industry has increased rapidly in size since the global recession began in 2008, and business is booming.[75]

[68] Tejada-Linde, 5.
[69] Ibid.
[70] Hess, 17.
[71] Hess, 17.
[72] Lloyd's Register, 8.
[73] Chitravanshi, 2011.
[74] Ibid.
[75] Hulsen et al., 2013.

However, for several reasons, overseas scrapping is simply not a realistic option for DNR's repossessed derelict vessels. For many years the US government and private American shipping companies utilized overseas shipbreaking to dispose of their vessels.[76] However, that practice underwent serious scrutiny by members of the U.S. Congress and the greater environmental community in the late 1990's, and in 1997, the U.S. Navy suspended its efforts to dispose of vessels overseas.[77] With the exception of one or two highly controversial instances subsequently, this was the end of the U.S. government's (state and Federal) overt involvement with overseas ship scrapping. International regimes such as the Basel Convention on Hazardous Wastes have also kept the practice from being truly viable to United States ship owners looking to dispose of their vessels. As a result of international and Federal legal impediments, overseas shipbreaking is simply not an option for DNR in its derelict vessel disposal efforts.

2.4 - Domestic Recycling

The final alternative DNR could consider is the recycling of derelict vessels domestically. This would involve removing the vessel, preparing it for transit to the disposal site in the United States, transport, then actual disposal. This alternative is immediately hampered by stringent environmental regulations, a diminutive domestic ship recycling industry, and by the historical lack of a fully compliant facility on the West Coast. Still, this alternative represents an attractive option given the appropriate conditions, and warrants further examination.

Despite the difficulties of sustaining a ship recycling facility in the United States, the industry does exist domestically. At the present time, the practice of scrapping large

[76] Hess, 58.
[77] Hess, 4.

commercial vessels exists almost exclusively in Brownsville, Texas. Located at the southernmost tip of Texas, Brownsville offers a case study in ship recycling operations. Part of its advantage lies in its geography, as Brownsville plays a critical role as the gateway to Mexico under NAFTA.[78] Goods flow freely through an established "U.S. Foreign Trade Zone", and there is terrific access to both the highway systems of Mexico, the Texas Intercoastal Waterway and Gulf of Mexico.[79] As is true historically with many "frontier" cities, Brownsville has made a business out of embracing fringe enterprises: the domestic recycling industry fits this mold perfectly.

There is no question that ship recycling is a "risky, highly speculative business".[80] The limited profit margin and the "dirty" nature of the work have made survival in the industry extremely rare. Companies have come and gone in maritime cities such as Baltimore, Newport, Virginia, and Terminal Island, California.[81] However, companies like Esco Marine, Inc. and International Shipbreaking Ltd. have survived the last 20 years in Brownsville, essentially anchoring a volatile industry. There are certain aspects of the business model of these companies that make their enterprises especially successful. The first key is proximity to the end destination of the material derived from these vessels. The location of these scrapping facilities is a short distance across the border from Mexican steel mills, where much of the ferrous material that is extracted from the scrapped vessels is sold.[82] The Brownsville companies can easily sell their scrap metal to these mills with a minimal amount of effort and

[78] City of Brownsville, 2007.
[79] City of Brownsville, 2007.
[80] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, F-33.
[81] Englund and Cohn, 1997.
[82] Ibid.

cost. These steel mills represent an easy readymade buyer for the results of the demolition operations.

The second aspect of the Brownsville business model that lends to the industry's success is its access to large amounts of cheap labor. The city has 3 border crossings, and naturally is a settling point for people entering the US looking for work, legally and illegally. Shipbreaking involves a mix of low to moderately skilled labor along with many unskilled workers, at least in comparison to ship building or repair.[83] The Brownsville companies are able to draw heavily on this available workforce, to their significant advantage.

However, the most important thing that has allowed the Brownsville scrappers to continue their business for so long is the mostly continuous source of vessels provided by the Federal government for demolition. Several hundred miles up the coast lies one of the U.S. Maritime Administration's (MARAD) three major National Defense Reserve Fleet (NDRF) anchorages, in Beaumont, Texas.[84] The NDRF is a collection of obsolete, but potentially useful merchant and naval vessels that can be activated and used in times of crisis or emergency.[85] A subset of the NDRF is kept in relatively good condition for use as training vessels, emergency sealift, possible museum ships, and even for spare parts.[86] Most recently, a small group of NDRF vessels were mobilized to assist in the response to Hurricane Sandy.[87] However, many of the vessels are designated as "non-retention", meaning that there is very little use for these rusting hulks.[88] These vessels are anchored together in various states of disrepair, some so old

[83] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, 7.
[84] Federation of American Scientists, 2013.
[85] Ibid.
[86] Maritime Administration, 2013.
[87] Ibid.
[88] Ibid.

that they are in danger of sinking and spilling oil and toxins into the surrounding water.[89] MARAD is required to dispose of these vessels in a way that maximizes return for the U.S. government.[90] However, the inability to scrap vessels overseas and the volatile nature of the domestic scrapping industry has made MARAD's mandate extremely difficult to fulfill. Scrapping of NDRF vessels has proceeded extremely slowly in recent years, and more vessels have been added than have been disposed.[91] As of February 2013, there were 132 vessels at the 3 separate anchorages in the NDRF, with 32 of these vessels designated as "non-retention".[92] With the Navy's ambitious shipbuilding efforts, this number could easy increase, as older naval auxiliary vessels are rotated out of active service. Additionally, many of the 100 remaining vessels designated to be retained could easily be switched to non-retention status, if they are deemed no longer useful.

As a result of the growing environmental danger these ships pose, MARAD has been ordered on several occasions to increase their disposal rate, starting with the disposal of the ships in the worst condition.[93] In 1991, the U.S. General Accounting Office issued a report concluding that strategic sealift on a large scale, necessitating the use of even the most obsolete NDRF vessels, was a thing of the past.[94] In 1994, Congress directed MARAD to dispose of all non-retention NDRF vessels by 2001 (later extended to 2006), a goal that MARAD did not even come close to achieving.[95] MARAD first sent out calls for bids to buy the vessels outright for scrapping, but as the economy, the number of domestic scrappers, and the price of scrap

[89] Noland, 513.
[90] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, 5.
[91] *National Defense Reserve Fleet*, 2013.
[92] Ibid.
[93] *Report to Congress on the Progress of the Vessel Scrapping Program*, 1.
[94] United States General Accounting Office, 3.
[95] *Report to Congress on the Progress of the Vessel Scrapping Program*, 5.

steel fluctuated, MARAD began to pay direct fee-for-service prices for scrappers to take the vessels.[96] To this end, MARAD has attempted to certify certain scrapping companies as acceptable destinations for NDRF vessels, based on the facility's technical capacity and environmental compliance.[97] As a result, in the last couple of years the Brownsville scrappers have received a steady stream of vessels to dismantle, and this flow has kept the small group of companies afloat.

2.4.1 - Washington State Facility

Despite the attractiveness of Brownsville as an option, this alternative cannot be utilized in its present state. DNR simply does not have the resources to contract out the preparation and towage of its vessels several thousand miles to the Gulf of Mexico for demolition. However, the success of the Brownsville business model is important in the consideration of DNR's domestic recycling alternative because it allows for the hypothetical visualization of a facility in Washington State. To date, there is only one fully compliant ship scrapping facility on the West Coast, and it has recently announced plans to shift to repair work, due to its inability to compete with the Brownsville companies.[98] As a result, there is a distinct need for some kind of facility on the West Coast, and especially in or near Washington State.

The idea of having a vessel disposal facility in Washington State is not a new one. Several businessmen in similar industries located in the Gulf of Mexico have reached out on several occasions to DNR about the possibility of starting such a venture.[99] These explorations were centered on a location in Grays Harbor, called the Aberdeen Log Yard. The Washington

[96] Vogel, 2009.
[97] *Ship Dismantling and Recycling*, 2013.
[98] York, 2013.
[99] Ibid.

State Department of Transportation (WSDOT) purchased this property in 2010, and proceeded to construct a 1200-foot long concrete graving dock.[100] This graving dock would be used for the building of concrete pontoons for the State Route 520 floating bridge, under reconstruction between Seattle and Bellevue.[101] This was presumably notable for prospective ship recyclers because graving docks, along with traditional marine drydocks, are generally the best and most environmentally friendly facilities for dismantling vessels.[102] This 55-acre property, once the floating bridge was complete, could conceivably be used to dispose of all types of large vessels. WSDOT is still in the process of constructing the concrete pontoons, so any future plans for the Grays Harbor property are on hold. However, the possibility of DNR obtaining the facility in the future begs the following question: could a facility designed to dismantle derelict vessels really solve the numerous economic and environmental problems DNR faces? If so, what would a successful facility look like? What other considerations would need to be examined?

[100] Washington State Department of Transportation, 2-6.
[101] Washington State Department of Transportation, 2-6.
[102] Personal interview, 2013.

3 - Conditions for Success; Pros and Cons

In order to determine whether a ship scrapping facility could be successful, the conditions that would define success must be identified. First, the litany of environmental issues that accompany all derelict vessels must be at least addressed by the facility. The facility must be able to safely abate all hazardous substances that can be found in an ADV, break down the vessel, and be able to dispose of these substances all in a safe manner. Secondly, the facility must be able to provide DNR with a ready and reliable destination for their removed derelict vessels. The facility would not necessarily have to be only dedicated to DNR ADVs, but it must be able to accept these vessels at all times. Thirdly, the existence of the facility must in some way stop or at least interrupt the downward spiral of ownership and neglect that often characterizes the final years of a vessel before it is abandoned. In other words, the facility must provide a clear and reasonably attractive "end-of-life" process for commercial vessels, as the authorized public entity in any particular removal situation should feel more comfortable with choosing disposal as an option. Finally, the facility must have a workable business model, including considerations of funding, revenue, and costs. This is perhaps the most important condition that defines the success of a facility, as construction and operations cannot be realized without fulfilling it.

The simple act of creating such a facility would go a long way towards beginning to fulfill the conditions of success outlined above. The construction and use of a disposal facility by DNR (or other authorized public entities) would guarantee that the disposal was being done in the most environmentally friendly way possible, as the facility would be built to comply with current state and Federal environmental law and regulations. The use of the best possible

technology for disposal would also guarantee compliance with these strict standards. Additionally, there would no longer have to be uncertainty about the use of various contractors; a thorough vetting process would need to occur only once. The rampant illegality that typically accompanies ship recycling would be eliminated in this case, and there would be no question that disposals at this facility would always comply with the strictest environmental standards.

Another advantage is that DNR would presumably have a ready location available at all times to deliver their derelict vessels for disposal. The existence of a specialized facility would remove the challenge of trying to convince commercial shipyards to do vessel demolitions, when doing such work is not often in their interest. DNR can only remove as many ADVs as it can get rid of, either by sale or demolition. Under the current conditions, even if DNR had increased funding, the agency's ability to dispose of large vessels is hampered by the limited availability of shipyards.[103] Having a publically or otherwise owned facility would permit DNR's removal rate for large vessels to increase. Also, a facility with a drydock or graving dock appropriate for one large vessel could handle many smaller removals, allowing for cost effective demolition.

Such a facility could yield several additional advantages over DNR's other alternatives. First, a facility could increase the cost effectiveness of disposing a single vessel. Much of this savings would be derived from labor and hazardous materials remediation. For example, asbestos handling is an extremely specialized operation, and shipyards contract with special crews to complete the work. These crews could be called in once for several vessels instead of

[103] Personal interview, 2013.

several times for several vessels.[104] The same streamlining would hold true for the skilled welders and cutters who do the majority of the demolition work. DNR could expect a certain amount of savings from a facility in this way. However, these particular advantages could only be realized if certain conditions were fulfilled, conditions that constitute the key factors in the ultimate feasibility of the facility, outlined below.

The facility alternative potentially presents a form of moral hazard, a disadvantage to the extent it cannot be neutralized. The existence of a scrapping facility could inadvertently increase the incentive for private individuals to simply abandon their vessels when maintenance becomes too expensive. Instead of finding a legal and environmentally sound way of disposing of old vessels at a cost to themselves, owners might be encouraged to choose abandonment as a course of action. Much in the way that Federal flood insurance appears to actually encourage developers to build houses in hazardous floodplains, vessels owners might be encouraged to abandon their ships anywhere, as the existence of a scrapping facility would seemingly ensure that those vessels would be eventually removed and disposed.[105] As a result, the facility alternative does not interrupt the downward spiral of ownership, but may rather accelerate it.

[104] Personal Interview, 2013.
[105] Sherden, 110.

4 - Key Factors in the Feasibility of a Facility

There are several key factors that determine whether a scrapping facility in Washington State could exist. These key factors must be considered in full and resolved to the greatest extent practicable in order for the facility to be realized.

4.1 - Ownership

The first key consideration in the feasibility of a scrapping facility is ownership. There are three models under which a facility's ownership could be arranged: a fully public facility, a fully private facility, or a facility that incorporates both sectors. There are benefits associated with each that could be critical to the success of the facility alternative.

4.1.1 - Public Facility

The first ownership possibility is a fully public scrapping facility. The state would build, own, and operate the facility, and would directly provision the public good of removing and disposing of derelict vessels. The facility would have to be a turnkey operation, one that only operates when there are vessels to be demolished. Workers would be government employees, and would cover the entire range of essentially duties, from management to HAZMAT remediation. All profit from operations would be put back into the state, and non-monetary benefits would be provided to the environment and public as a whole. This ownership possibility essentially relies on the condition that a facility could pay for itself.

However, it is clear that a fully public facility simply is not feasible, primarily due to economics. The original economic problem with derelict vessels was that the government didn't have the resources to even remove large vessels, much less dispose of them. This government failure would only be compounded by further attempts to fix the externality resulting from the

sale of used vessels. The state government simply could not come up with the capital to build such a facility, especially in today's budgetary climate. The public would likely be unwilling to provide tax dollars in proportion to the risk posed by these vessels to the environment. Additionally, the revenue from scrapping operations most likely would not be able to cover the high costs of every aspect of the facility's operation. Although it seems to be the government's responsibility to provide the public good of derelict vessel -free waters, a solely government owned facility could not hope to provide this good.

4.1.2 - Private Facility

The second ownership possibility is the purely private facility. A purely private facility would involve a private entity building, owning, and operating a scrapping facility. This model would require profits to be realized, as no private entity would become involved in such an operation without a profit margin. The Brownsville industry provides a critical case study in the workings of the private ship scrapping operation, and many of Brownsville's successes can be used as valuable lessons to DNR's efforts.

4.1.2.1 - Flow: A Key Aspect of Private Sector Provision

The feasibility of a fully private scrapping alternative is subject to many factors. The first of these has to do with the consistent flow of vessels coming into the facility for disposal, known as feedstock. If DNR or other authorized public entities do not happen to have any vessels to dispose of, then the facility would potentially sit idle and lose money during those times. This is where the business model of the Brownsville scrapping companies offers critical information. If the facility, similar to the Brownsville companies, could dismantle NDRF vessels in the spans of time when derelict vessels are not being scrapped, the facility could stay in

operation for an extended period of time. MARAD also maintains an anchorage in Suisun Bay, California and batches of vessels could be acquired from there and kept on site until there is available capacity to scrap them, giving a Washington State facility ability to control scheduling while also addressing the important question of whether a flow of vessels sufficient for economic viability can be assured.

Another lesson to be derived from the Brownsville companies is to have an assured destination for the scrap steel after the vessel has been dismantled. The Mexican steel mills were readymade outlets for the output of scrapping operations, and the Brownsville scrappers benefit enormously from their proximity. If DNR or a partner company could figure out a way to consistently sell the scrap metal derived from vessel disposals, then some of the costs of disposal could be recouped and the scrapping flow process could be established. The creation of a full input-to-output process is important because it would standardize the steps of taking apart a vessel, and reduce uncertainty about where the vessels are coming from and where the scrap steel is going.

The creation of a full, established input/output process has been written about extensively in operations and production literature, and the benefits of setting up what is known as a continuous flow process are almost universally agreed upon in the private sector. A continuous flow process is one whereby multiple jobs are worked on at once, and work on a subsequent unit is begun before the work on a previous unit is complete.[106] This type of workflow is used primarily in the production of commodities where the output is continuous,

[106] Khanna, 94.

such as sugar, chemicals, or cement.[107] While the use of such a workflow seems intuitive, many industries are only now switching over from traditional batch flow processes.[108] However, despite the slow switch of certain industries, the advantages are numerous, including increased throughput, increased safety, reduced waste production, and a reduced amount of space required to conduct the operation.[109] Although ship scrapping is different than simple manufacturing and can never truly be continuous, the benefits of ensuring as steady and complete workflow as possible, from vessel acquisition to scrap sale, could yield the very same benefits. If a scrapping facility could approach this ideal similar to the way the Brownsville companies have, then the initial cost of such a facility could be recouped sooner. This would represent a significant step towards guaranteeing a workable business model.

4.1.2.2 - Federal Involvement

Another key factor in the feasibility of a fully private scrapping facility involves creating an extended agreement with the Federal government, as a way to guarantee flow. The success of the Brownsville business model shows that going into business with the Federal government can yield exceptional results. The truth is that the NDRF is growing, and vessels will be added to the non-retention category in the future. Additionally, the current lack of domestic scrapping capacity guarantees that the environmental hazards of keeping aging vessels at anchorage will increase over time. As these hazards increase, the government will come under increasing pressure to get rid of the non-retention vessels at a faster pace, which could come at an increasing cost to the U.S. government. The ability of the Brownsville scrappers to enter into an

[107] Khanna, 94.
[108] Hebert, 2009.
[109] Ibid.

agreement with the Federal government has kept them in business. Some type of agreement could be worked out to the benefit of DNR's notional scrapping facility that would allow the facility to cover some costs, dispose of derelict vessels economically, keep a steady flow of vessels, as well as help the government dispose of their ships.

Such an agreement is feasible given the need for both parties to be rid of their vessels. From DNR's perspective, Federal involvement would need to insure the consistent flow of vessels to the facility during downtimes in derelict vessel scrapping. From the Federal perspective, a Washington State facility would be able to provide competition to the Brownsville companies, and create a much needed West Coast facility for vessel demolition. DNR should look to initiate conversations with MARAD about this possibility, as it represents a key factor in the creation of a workable business model and in the success of the facility.

4.1.3 - Public-Private Partnership

The argument for a fully private scrapping facility has its merits; however, the possibility of combining both private and public sectors in some way must be explored. Since the derelict vessel problem is a combination of public and private issues (market and government failures), it would make sense that a combination of public and private fixes could provide a solution. This is commonly known as a public/private partnership.

The definition of a public-private partnership (also known as a "P3") varies widely depending on what the goal of the partnership actually is. According to the U.S. Federal Highway Administration, public-private partnerships are "contractual agreements formed between a public agency and a private sector entity that allow for greater private sector

participation in the delivery and financing of transportation projects."[110] This definition explicitly relates P3's to transportation projects, and this is not by mistake. Transportation projects have all of the characteristics of the type of projects that give public entities a headache. They are often extremely large, expensive, complex, and perhaps most importantly, viewed as necessary.[111] Additionally, the development of transportation infrastructure is largely (and perhaps rightly) considered to be the responsibility of the government.

A second definition of P3's offers an interesting refinement and contrast, stating that these partnerships are "relationship[s] between public and private sectors where a long term contract permits the public agency to have full ownership [and] oversight of the project, while the private entity operates and collects generated revenue."[112] This definition is important because it elucidates some of the possible roles for the respective public and private entities. Public agencies are typically designated as the owners of the facility or structure being developed, providing oversight and capital. The private sector in this scenario is the builder and operator of the facility, reaping the benefits of good management in the form of revenues. This definition is also explicit in showing that any partnership must be a long term one, because total effectiveness is only achieved over time, and because infrastructure projects are long-term investments.

There is a third definition, this one from a publication of the nonpartisan Council of State Governments (CSG) that provides one final important detail. A 1991 CSG study of environmental partnerships in Japan and the U.S. defined P3's as "structural arrangements and

[110] *P3 Defined*, Federal Highway Administration, n.d.
[111] Levy, 6.
[112] Levy, 1.

interactive processes between public and private sectors which create 'public goods'."[113] It is clear here what the goal of these partnerships is in this case; namely to use the private sector as a way to provide public goods in a situation where the public sector may not be able to do so on its own. This definition uses softer language with respect to the type of interactions between sectors, calling them "arrangements and processes" instead of "contracts". This is perhaps because such partnerships were still relatively underutilized in the U.S. in 1991, as compared with other nations such as Japan. Still, this definition is helpful because it recognizes the essential services that normally should be provided by the government can often be covered through agreements with the private sector.

Today, there is excellent precedent for setting up this type of arrangement in the United States, particularly in transportation related infrastructure. As of 2013, a considerable number of highways and tunnels in the U.S. have been designed, built, and operated through some form of public-private partnership.[114] P3's are also used extensively in telecommunications, energy, and other transportation projects (rail, seaport, etc.) across the world.[115] These partnerships will become more common as pressures on infrastructure increase, while access to technical and monetary resources decrease.[116]

There is substantial variation on the central theme of partnerships in transportation infrastructure, and choosing the right one is a matter of recognizing the particular needs of the project, in this case, a vessel scrapping facility. These variations are spread out over a spectrum of involvement and responsibility, ranging from simple private contract-fee services, to facilities

[113] Jacobs and Harris, 3.
[114] Levy, 3.
[115] Ibid.
[116] Levy, 2.

where the private sector designs, builds, finances, operates, and maintains the asset.[117] A private entity could finance, build, operate, and generate revenues from a facility over the period of a contract, then turn the facility over to the public entity.[118] A public agency could lease the facility to the private sector, provide tax incentives, or even make public payments on a performance related basis.[119] The range of alternatives is vast, and depends largely on the role of the facility within the larger transportation context, as well as the ability of revenue seeking entities to provide a public service.

However the specific design, P3's yield several benefits and advantages that cannot be ignored; three in particular are especially relevant to DNR. First, these partnerships often free up public funds by allowing private groups to fund any part(s) of the facility's design, construction, and operation.[120] In the cash-strapped environment in which the DVRP exists, the ability to save money is enormously important. The trade-off is that the private entity would expect revenue from such an agreement. However, when the ultimate goal of the enterprise is a public good in a form other than money, it may be worth it for the public entity to consider such a tradeoff. The second advantage to this type of partnership is the sharing of risk between the two sectors.[121] Since a vessel scrapping enterprise is already fraught with many types of risk, it would make sense for a public entity such as DNR to share this risk. If the private sector could be involved, with sufficient oversight from the government, the result could be a drastic reduction in the danger posed by derelict vessels.

[117] *P3 Defined*, Federal Highway Administration, n.d.
[118] Levy, 2.
[119] Levy, 2-3.
[120] Levy, xi.
[121] Levy, xii.

The final advantage of a partnership involves the efficiency of maintenance and operation of an asset. The public sector is often operationally hampered by politics, finances, and other issues unique to governments.[122] Meaningfully involving the public sector can often reduce these impediments and allow for a smoother and better managed facility.[123] However, these operations must be continually overseen by the government. As appears to be true in Brownsville, private entities sometimes willfully cut corners when regulatory oversight is lax.

A facility designed to scrap vessels could easily fit into this framework, and in this day and age, it is nearly impossible to complete a large project like a scrapping facility without some sort of private sector involvement. To a large extent, aspects of P3's are already being used to scrap vessels. However, there are a number of things that must be done to ensure the success of such a partnership with respect to an entire scrapping facility. First, there must be total transparency from both the private and public entities, from the bidding process all the way to the operation of the facility.[124] There should also be a clear, defined business plan and revenue stream.[125] If a revenue stream can be established, the efficiencies of private sector workflow and management may allow the facility to survive. The project must have stakeholder support as well, since a joint venture scrapping facility affects local communities and people as well.[126] Once again, this may prove difficult as ship recycling is somewhat of a "dirty" enterprise. The extent to which stakeholders support a facility would largely depend on its site-specific characteristics, something that will be examined below. Finally, from the state government's

[122] Levy, xii.
[123] Levy, xii.
[124] The National Council for Public-Private Partnerships, n.d.
[125] Ibid.
[126] The National Council for Public-Private Partnerships, n.d.

perspective, the private entity "partner" must be chosen very carefully.[127] The lowest bidder is not necessary the best choice, as many other factors play a role in the success of an enterprise, such as the financial capacity and past project experience of the entity.[128] A long-term joint success is characterized by a good working relationship between public and private. As mentioned above, the tenets of a successful public-private partnership are practiced to some extent already, in DNR's competitive bidding process and award system. Still, if a scrapping facility was to be seriously considered, the nature of the interaction between public and private must evolve, as a facility like that represents an extremely large commitment for a state agency.

This consideration is enormously important, as success in creating a partnership may determine whether a facility is built at all. Any partnership would have to result in some sort of upfront capital, as initial cost may be the biggest preliminary hurdle for either a fully private or fully public ownership scheme. DNR must actively seek out partnerships of this sort with the private sector; shipyards, venture capital firms, and even environmental NGOs could be viable candidates. This factor is critical to the viability of the scrapping business plan, as well as of the success of the facility.

4.2 - Location

Another key consideration in the feasibility of a ship scrapping facility in Washington State is location. While evaluating possible locations may be preemptive given the difficulties in reconciling the industry economics, location plays an extremely important role in determining the feasibility of such a facility. Additionally, location could be the lightning rod issue for the

[127] The National Council for Public-Private Partnerships, n.d.
[128] Ibid.

different stakeholders involved in the creation of a facility. To this end, it makes sense to create a set of practical criteria to set up the eventual exploration of different locational options. These criteria must be examined for each possible scrapping facility location.

4.2.1 - Upfront Cost

Upfront cost in this case refers to the amount of money facility investors must spend to first acquire a property, then to create the necessary infrastructure within the property to allow vessels to be dismantled. Acquisition of the property can either involve buying or leasing of a parcel. Obviously, buying the property involves far higher upfront costs, whereas leasing means that rent must be paid throughout the lifetime of the facility. Once the property is acquired, it must be set up with the proper infrastructure and equipment to allow vessels to be dismantled at a high rate. No matter what location is chosen, the costs for the proper equipment may be the same, unless local jurisdictions provide tax forgiveness or similar incentives. However, depending on the use of the property before acquisition, certain infrastructure must be created to support the scrapping of vessels. As mentioned above, graving docks and drydocks are the most environmentally sound methods for scrapping vessels, because they catch any discharges before they reach the surrounding waterbody, and they can be easily cleaned; these also represent the most expensive option.[129] In the U.S., the only other legally feasibly method is "alongside" scrapping, where vessels are taken apart top down until all is left is the hull, at which point it is dragged onshore or into a drydock.[130] This second method still creates a potential hazard for hazardous discharges, so the drydock/graving dock option should be

[129] Lloyd's Register, 12.
[130] Ibid.

preferred. For facilities that do not have a drydock or graving dock, facility investors would have to bear the cost of building one.

4.2.2 - Operational Cost

Operational costs refer to the costs of operating and maintaining the facility once scrapping begins. There are a large number of direct and indirect costs that make up this particular criterion, including labor, feedstock (vessel) cost, subcontracted costs (HAZMAT remediation, etc.), and personnel protection costs.[131] These operational costs will mostly be the same no matter where the facility is located, except for state contract prevailing wage.[132] Another notable exception to this is the cost of voyage preparation and towage of the vessel to be scrapped, from its resting place to the scrapping facility. With respect to derelict vessels, a facility should be located near the highest concentration of ADVs, which would both prepare the facility to deal with existing ADVs as well as expected future ADVs. However, this is not as easy as it sounds in Washington State, as derelict vessels are typically found in roughly equal numbers in Puget Sound and the Columbia River.[133] This is part of the reason why Grays Harbor was initially considered, due to its location approximately halfway between the two major concentrations of ADVs.[134]

From the standpoint of towage of NDRF vessels for scrap, it would only make sense to tap the Suisun Bay NDRF fleet, as it is the only major MARAD anchorage on the West coast. There would be no difference in towage preparation depending on the facility location; only

[131] MARAD, *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, F-22. 1997. This volume provides an excellent initial examination of the operational costs associated with scrapping vessels. For another examination of operational costs, see Ronald Hess, 2001.
[132] Personal interview, 2013.
[133] Ibid.
[134] Ibid.

total tug miles would be affected. According to a 2001 Crowley Marine Services estimation, a tug homeported in Seattle bringing a Suisun Bay vessel to Bremerton would travel 1702 miles, spending 871 miles of that towing a large vessel.[135] A similar scenario towing an NDRF vessel to a notional Columbia River facility would be roughly a quarter-voyage shorter. While the cost per mile estimated by Crowley in 2001 most certainly higher today, this estimation still provides an idea of the variation in operational costs that towage creates.

4.2.3 - Legal Framework

Another practical criterion that may vary from site to site would be the particular legal framework of the facility. Facilities of identical designs, layouts and capabilities would ideally be subject to almost the exact same range of laws and statutes, no matter where in Washington State they are located. These various regulations run the full spectrum of topics, from air, water, and hazardous materials, to labor and safety codes. These regulations usually manifest themselves in the form of a catalog of permits a facility must obtain. Based on the results of the Washington State Governor's Office of Regulatory Assistance permit questionnaire, a notional scrapping facility within the city limits of Aberdeen, WA (the Grays Harbor facility) would require no less than 19 permits, approvals, or licenses to operate.[136] While this represents a huge burden on the applicant in terms of money and time to acquire these permits, some are one-time permits that can be transferred as properties are bought and sold. This means that based on the previous use of the facility being acquired, some of the regulatory burden could be taken care of. For example, if the facility already was equipped with a moored floating drydock, presumably the previous owner would have already acquired the appropriate permits

[135] Hess, 33.
[136] Washington State Governor's Office of Regulatory Assistance, 2013.

from the U.S. Army Corps of Engineers for the mooring of that drydock. This permit could be transferred to DNR easily, thus preempting much of the time and money getting such a permit would require. However, the simple truth is that an operation as environmentally sensitive as ship scrapping will always be subject to the regulatory idiosyncrasies of local, state, and Federal permits. Any operator of a scrapping facility must be prepared to deal with these permits as a consequence of the facility's activities.

4.2.4 - Public Acceptance and Feasibility

Another consideration that could easily vary from site to site is the public acceptance of the scrapping facility. To large extent, this acceptance can be reflected (and dealt with) in the public comment process that would accompany the creation of any facility. However, indirect public impacts such as noise and impeded viewsheds could easily create resistance in the local community against a scrapping facility. Excessive noise in particular can create negative physiological, behavioral, and subjective effects in humans; the impacts on wildlife can be arguably even greater.[137] The need for some degree of public acceptance therefore means that such a facility would need to be in a place where noise and visual impacts could be mitigated in some way; this typically would mean that noise and impeded viewsheds must already be known impacts in the proximity of the chosen site. A certain amount of public acceptance will also be defined by the ideological bent of the neighboring areas, and even in the region as a whole. Because of its uncertain nature, this level of public acceptance may not be able to be addressed in any way.

[137] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, 11-12.

Intricately related to public acceptance is the idea of political feasibility, which in many ways is simply a reflection of the public's feelings about a project. However, political feasibility also involves the ability of a project to even get off the ground in the first place. Large infrastructure projects require political support of some kind, and a ship scrapping facility would be no different. There has recently been an upswing of awareness and political support for the issues that derelict vessels present in Washington State, as evidenced by the success of ESHB 1245. Because of this, it would not be hard to imagine at least cautious support for a scrapping facility. However, feasibility does not simply hinge on the extent of support for a project; it also entails the opposition to a project.[138] In this vein, it would make sense for a scrapping enterprise to attempt to preempt many of the issues expected (i.e. viewsheds, noise) in order to raise the possibility the project would be successful in the political arena.

One last consideration that must be examined is the possibility of using an existing site for a scrapping facility. This seems self-evident, as DNR already utilizes existing shipyards for their vessel recycling. However, the distinction here would be the use of an existing facility as a scrapping yard, one that would not have to compete with new-buildings or repairs of drydock space. As stated by MARAD in their 1997 environmental assessment of vessel scrapping operations, "it is unlikely that new ship scrapping facilities will be constructed in pristine coastal locations of the United States."[139] In other words, existing facilities have already impacted the environment in their respective areas, and given these impacts, it is hard to believe that a new facility could be created in a non-industrial area. In Washington State, there are limited

[138] Bardach, 41.
[139] *Environmental Assessment of the Sale of National Defense Reserve Fleet Vessels for Scrapping*, 7-8.

locations that could fulfill this criterion, and these locations should clearly be examined first for feasibility.

4.3 - Integration with Other Existing Programs; Fishery Buyback Example

Another key factor in the feasibility of a Washington State is the integration of a scrapping program with existing programs, either at the state or Federal level. Any attempt at creating such a facility should explore fully any opportunities to tie a new scrapping program into an existing structure, statute or program. For example, DNR's vessels scrapping efforts could be aligned with the provisions of the Magnuson-Stevens Act 2007 reauthorization that provides a framework for implementing fishing capacity reduction programs, commonly known as buybacks. Buybacks are programs where fishing licenses, endorsements, and/or vessels are purchased by governmental or private entities with the goal of reducing the pressures of overcapacity on a commercial fishery.[140] Buybacks are designed to increase the profitability of the remaining fishing fleet, while conserving stressed fish stocks.[141] In the United States, the Governor of a coastal state, the appropriate fishery management council, or a majority of fishing permit holders can request that the National Marine Fisheries Service (NMFS) conduct a buyback.[142] While there are many types of buybacks, one in particular, known as decommissioning, involves permanently removing some vessels from a certain fishery.[143] While often decommissioning simply removes the legality of a vessel to operate in a certain fishery, scrapping of decommissioned vessels has been used in the past as a viable option.[144] This type of decommissioning can be extremely effective, as it keeps those vessels removed from a

[140] The World Bank, xiii.
[141] Groves and Squires, in Curtis and Squires, 16.
[142] Federal Register, Vol. 75, No. 195, Pg. 62327.
[143] Guyader et al., in Curtis and Squires, 105.
[144] Guyader et al., in Curtis and Squires, 117.

fishery from simply entering another, known as the "spillover effect".[145] Given overcapacity in Pacific Ocean fisheries, this existing governmental program could perhaps become a source of ships to a scrapping program created by or for the benefit of DNR.

Of course, effective and efficient integration of two existing programs requires thoughtful program design. In this case, the buyback must be designed so that the vessel is locked to the license, so that the vessel owner will not simply buy another, more advanced ship to reenter the fishery.[146] To a large extent, this may happen anyway, as vessel owners recapitalize on newer, more effective fishing vessels.[147] However, tying the license to the vessels means that these owners cannot enter the same fishery until recovery has occurred. Buying the vessel and its accompanying license is extremely expensive, to the point where a single private entity or a single public entity could not possibly bear the cost. As a result, the possible funding mechanism for a decommissioning buyback where the vessels are scrapped would involve some sort of combined public/private joint venture.[148] In 1994-1995, Denmark conducted a successful buyback of this nature, effectively shrinking the fleet by 30% compared to 7 years earlier.[149] If a similar buyback were to be conducted in the Pacific by NMFS, a scrapping facility could make money on these decommissioned fishing vessels. Once again, any effective combination of existing programs must incorporate thoughtful program design in order to be successful.

In order to fully utilize existing programs such as the NMFS fisheries buybacks, DNR should explore possible program connections comprehensively. There may be a limited number

[145] The World Bank, 66.
[146] Groves and Squires, in Curtis and Squires, 27.
[147] Holland, 47.
[148] Groves and Squires, in Curtis and Squires, 44.
[149] Holland, 58.

of programs that could be applicable to DNR's efforts, but some creativity may yield a worthwhile combination. Once again, a serious conversation with the Federal government is needed, as a way of beginning a dialogue about which Federal programs could be helpful. Adding onto (coordinating with) existing programs could possibly lower DNR's costs, and provide other benefits that could allow for a better working business model.

5 - Summary and Conclusions

DNR faces a difficult series of problems in their efforts to address the ADV threat in Washington State. First are the environmental issues that accompany all ADVs, including leftover oils and other hazardous substances. Secondly, DNR's budget is not equipped to deal with the problem effectively, especially with respect to large, mostly steel, vessels. This is compounded by the fact that the larger the derelict vessel is, the more expensive it is to address. However, DNR cannot simply ignore large vessels, because the opportunity cost of doing nothing is exponentially higher. Even if DNR were able to remove large vessels consistently and effectively within their budget, there are simply no good options for disposal of these large ships. Demolition and disposal of these vessels require a certain type of specialized facility, a constraint that creates extreme difficulties for the agency. Finally, a public goods problem with serious negative externalities currently exists, as ship owners often choose to simply abandon their vessels as soon as maintenance and ownership becomes too expensive. This ensures that the derelict vessel problem will continue as long as things remain the same.

There are a range of alternatives DNR could explore to address these problems. The agency could easily do nothing to change the status quo, and continue to operate under the current conditions. This alternative is the most likely, as it involves the least amount of initial cost, as long as no large vessels become abandoned. DNR could also create or participate in an artificial reefing program as a way to deal with the ADV problem. However, this alternative has serious cost and environmental drawbacks, ones that cannot be easily overcome. Another alternative would be to utilize overseas ship recycling, a practice that is widespread among international merchant fleets. However, cost and legality remain a serious impediment to this

alternative. Even if DNR had the funds to send their repossessed vessels overseas, the Basel Convention on Hazardous Wastes and the Toxic Substances Control Act render this alternative illegal.

The final alternative DNR could explore is the scrapping of derelict vessels domestically. DNR has historically used private shipyards in Washington State to dispose of their vessels, but this option is expensive, as shipyards typically do not have the time or inclination to do disposal jobs.[150] A domestic recycling industry does exist exclusively in Brownsville, but the distances involved render this option economically infeasible. The domestic scrapping alternative could potentially involve the creation of a facility in Washington State that DNR could use to dispose of its vessels, an aspect of this alternative that I examined in this paper, and which I recommend be examined more fully by DNR's future ADV workgroups.

There are several advantages and disadvantages to the creation of such a facility. First, the existence of a facility would guarantee that all scrapping that occurred would be done in compliance the highest environmental standards. The facility would be able to safely abate all hazardous substances, break down the vessel, and be able to dispose of these substances in a safe and acceptable manner. Secondly, a facility would provide a reliable destination for large ADVs (and potentially all ADVs), a destination that would remove the uncertainty authorized public entities such as DNR face when trying to dispose of a removed vessel. Authorized public entities would no longer have to fit in the schedules of private shipyards, and the facility would be an established, dependable destination. DNR could also potentially expect significant cost savings in the use of such a facility via streamlining and economies of scale, provided that a

[150] *2007 Interim Report on the Abandoned and Derelict Vessel Removal Program*, 8-9.

series of factors and conditions are arranged. These factors become the key considerations in the feasibility of the facility. One significant drawback of the creation of a scrapping facility is the creation of moral hazard among ship owners in the public. Absent additional regulatory controls, vessel owners would perhaps have even less a barrier to abandoning their vessels instead of paying to have them disposed of correctly. This particular moral hazard problem can actually be seen as a larger issue beyond the purview of DNR, as none of the presented alternatives offer a solution that could truly eliminate this negative externality.

It is critical to recognize the factors that significantly affect the feasibility of such a facility. A consistent flow of vessels is the first factor that must be established for the sake of economic feasibility, to the extent that is a consideration. This could be achieved by using other sources of vessels (or other work that would require similar facilities, technologies, and workforce) during downtimes of derelict vessel scrapping. As it happens, the Federal government has a supply of vessels that need to be disposed and an extreme need to dispose of them. This leads to the second factor, namely an agreement or arrangement with the Federal government. The prospect of a scrapping facility in greatly enhanced given the Federal government's need for such a service on the West Coast. The third factor is the integration of Washington State's DVRP (and accompanying facility) with existing programs on the state or Federal level. This is also quite feasible, provided that an open dialogue is established with other public entities, and these entities are willing to explore different programmatic combinations.

The final two factors in the feasibility of a facility are the two most important; without effectively addressing these factors, the facility as visualized cannot exist. Determining the

ownership of the facility will be absolutely critical, as it will have significant bearing on the availability of capital for initial construction. There are a variety of arrangements that can be used, and many of these arrangements are already used extensively in public infrastructure projects. DNR must explore these different types of arrangement in conjunction with the exploration of different potential private sector partners. This is feasible, as could potentially be several other entities willing to join such an enterprise. The other factor that needs to be examined carefully is location. Choosing a convenient, cost effective, logical location may be the difference between the success and failure of a scrapping facility. Upfront and operational costs associated with a particular location must be weighed for every possible site. The legal framework under which a certain site exists, including relevant jurisdictions and permits, is also key. Finally, public acceptance will be a huge factor in the selection of a site, as the degree of public acceptance could easily dictate the success of the facility. These are perhaps the most important criteria that must be weighed in the selection of a site for a scrapping facility in Washington State.

The Washington State facility version of the domestic scrapping alternative no doubt runs into a variety of impediments that affect its feasibility. A purely public facility will run into significant funding impediments, and a fully private facility would not be economically realistic, unless certain conditions are met. A consistent flow of ships needs to be secured, and there must be a level of public acceptance for such a project. These challenges may be difficult to overcome, since the success of this alternative is contingent on such a wide range of factors. Without other factors such as location and a sound business model also in place, such a facility could not work.

However, there are several things that DNR could do to further the possibility of a Washington State scrapping facility. First, such dialog as currently exists with the Federal government must be further pursued. As mentioned before, both parties have need for a new disposal option and a backlog of vessels to demolish. The goal of this dialog would be some kind of agreement on ways to address the joint disposal problems, and to explore ways to combine resources. Ideally, DNR could utilize the NDRF as a way to make the economics of a facility work. However, this alone will not be enough. DNR must also look to add or combine with existing programs elsewhere, a task that involves creativity. This leads to the third recommendation, the active courting of conscientious private sector partners. Such a partnership must involve some sort of cost and revenue sharing agreement, similar to the type that exist in many other transportation infrastructure projects across the country.

The lessons learned in the exploration of the facility alternative have given rise to a possibility which could help DNR in their efforts to address the problem of large derelict vessels. It is clear that some sort of public-private partnership will be needed to address this problem fully, and the active maritime industry in the Puget Sound may be fertile ground. As mentioned above, DNR currently must contract with commercial shipyards to do large disposals, despite it not being profitable to the private entities involved. However, DNR could approach a shipyard with the capacity to take apart large vessels, and begin a negotiation as to what it would take for the yard to take derelict vessels for disposal whenever they arise. It is not often that DNR must face a *Davy Crockett* or *Deep Sea*, so the capacity to take apart these large vessels may only be needed infrequently. DNR could attempt to enter into an agreement in order to secure the yard space for these jobs as needed.

The primary impediments for shipyards to take disposal jobs currently appear to revolve around the slim profit margin realized in disposals, the simple opportunity cost of doing a disposal rather than a more lucrative project, and restrictions on the generation of hazardous waste in shipyards under RCRA.[151] However, given the right incentives, shipyards could jump at the possibility of conducting a disposal, if the economics could be made to pencil out. The state could essentially subsidize the shipyard in some way to guarantee that DNR's vessels would be demolished quickly. In order for this to work, DNR must approach a series of shipyards, and find out what the private entity would need to agree to such a plan. The rulemaking workgroup created by ESHB 1245 is the ideal forum for preparing such a partnership. To this end, the workgroup must begin to survey existing shipyards, and identify which incentives can be realistically granted. The planned creation of a vessel deconstruction permit also could play a factor, this permit could allow for a disposal to not count against a shipyard's RCRA number. Since a partnership (possibly a subsidy) may already be necessary to deal with the problems DNR face, this avenue should at least be explored. This hybrid alternative may be the most viable method for DNR to address the problems it faces when dealing with derelict vessels.

In the end, it is simply too risky for DNR to attempt to realize the Washington State scrapping facility alternative at this point in time. In order for the alternative to work, most if not all of the various conditions mentioned above must converge, and it is extremely hard to imagine the funding condition in particular falling into place in this budgetary environment. Even the advent of a public-private partnership for the construction, ownership, and operation of a facility could put both sectors at an unacceptable amount of risk. Still, the partnership

[151] Personal Interview, 2013.

consideration yields valuable insight into how DNR should go forward. The aggressive courting of existing shipyards in pursuit of creating a subsidized arrangement is the best use of the state's limited resources now. If this route proves successful, DNR could expect to improve their ability to dispose large derelict vessels at acceptable costs, and to mitigate the negative effects of ADVs to people and the environment.

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