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## Who's Going to Pay for the Next Dam Disaster? The Complex Issues Emergency Managers Face When Dealing with North Carolina's Failing Dam Infrastructure Communities

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# WHO'S GOING TO PAY FOR THE NEXT DAM DISASTER? THE COMPLEX ISSUES EMERGENCY MANAGERS FACE WHEN DEALING WITH NORTH CAROLINA'S FAILING DAM INFRASTRUCTURE

STACY HANNAH<sup>1</sup>

## INTRODUCTION

“Natural and human-made disasters continue to adversely affect all areas of the world in both predictable and unpredictable ways.”<sup>2</sup> The National Centers of Environmental Information (“NCEI”),<sup>3</sup> track and evaluate the nation’s response to “severe weather and climate events in their historical perspective.”<sup>4</sup> With detailed information dating back to 1980, NCEI provides historical data regarding the economic impact of severe weather events to critical agencies, such as the National Hurricane Center.<sup>5</sup> Historical storm data informs agencies that then incorporate the data into risk assessments for future weather events, which yields better preparation and planning.<sup>6</sup> Data collected by NCEI assists emergency managers in avoiding unnecessary preventable loss when natural weather disasters occur.

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1. Ms. Stacy Hannah is a third-year law student at North Carolina Central School of Law and a Senior Editor of the NCCU Environmental Law Review (2018-2019).

2. James N. Logue, Commentary, *Disasters, the Environment, and Public Health: Improving Our Response*, 86 AM. J. PUB. HEALTH 1207 (1996), available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1380580/pdf/amjph00520-0025.pdf>.

3. NCEI was created under the Consolidated and Further Continuing Appropriations Act, 2015, Public Law 113-235. NCEI was designed to accommodate the growing demand for high-quality environmental data by the National Oceanic and Atmospheric Administration (“NOAA”), an agency within the United States Department of Commerce. NCEI is a consolidation of the National Climatic Data Center, the National Geophysical Data Center, and the National Oceanographic Data Center. *About the National Centers for Environmental Information*, NAT’L CTRS. FOR ENVTL. INFO., <https://www.ncei.noaa.gov/about> (last visited Sept. 29, 2018).

4. *Calculating the Cost of Weather and Climate Disasters*, NAT’L CTRS. FOR ENVTL. INFO., <https://www.ncei.noaa.gov/news/calculating-cost-weather-and-climate-disasters> (last visited Oct. 17, 2018).

5. *Id.* (“NCEI’s U.S. billion-dollar disaster analysis seeks to bring the best public and private disaster loss data together in a systematic approach. To that end, [NCEI] maintain[s] a consistent record of weather and climate disasters with cost equaling or exceeding \$1 billion in damages (adjusting for inflation) using high-quality data sources and peer-reviewed methods. This enables [NCEI] to provide historical context to these events when they occur while quantifying their total, direct costs.”)

6. *Id.*

To some degree, costly natural weather disasters are unavoidable. However, humans influence the frequency and severity of expensive weather-related disasters. NCEI reports that billion-dollar disasters have occurred with increasing frequency in the past several decades.<sup>7</sup> NCEI points to climate change as an influencer in the influx of certain types of extreme weather, specifically heavy precipitation events.<sup>8</sup> Notwithstanding the marked acceleration in severity, NCEI acknowledges that the increased population and thus material wealth is a critical factor affecting the growing frequency of billion-dollar disasters.<sup>9</sup> The nexus of increased weather severity and concentrated material wealth is further exacerbated by vulnerable infrastructure.<sup>10</sup>

The United States continues to rely on an extensive network of infrastructure that was built decades ago.<sup>11</sup> Absent attention to proper maintenance and upgrades, aging infrastructure is increasingly prone to catastrophe.<sup>12</sup> Age alone can make some categories of infrastructure more vulnerable, in turn creating threats to public safety.<sup>13</sup> For example, while it is known that advancing age often makes dams more likely to fail,<sup>14</sup> most of the dams in the United States are “well beyond their 50-year design life.”<sup>15</sup> In fact, the average age of the 90,580 dams inventoried by the United States Corps of Engineers is fifty-six years old.<sup>16</sup>

Unlike most infrastructure in the United States, dams are predominantly privately owned.<sup>17</sup> Private dam ownership creates unique obstacles for addressing critical infrastructural needs.<sup>18</sup> Private dam ownership complicates

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7. *Calculating the Cost of Weather and Climate Disasters*, *supra* note 3.

8. *Id.* In a recent study conducted by the NOAA, scientists found that “pronounced warm sea surface conditions” were a leading cause in the “enhanced major hurricane activity” in the Atlantic during 2017.

9. Kunkel, K. E. et al., *Monitoring and Understanding Trends in Extreme Storms: State of Knowledge*, 94, AM. METEOR. SOC’Y, 499-514, available at <https://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-11-00262.1>.

10. *Infrastructure*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/infrastructure> (last visited Oct. 19, 2018).

11. *The State of U.S. Infrastructure*, COUNCIL ON FOREIGN RELATIONS, <https://www.cfr.org/background/state-us-infrastructure> (last visited Nov. 2, 2018).

12. *Id.*

13. *Id.*

14. *Living with Dams: Know Your Risks*, FEMA, Feb. 28, 2013, available at [https://www.fema.gov/media-library-data/20130726-1845-25045-7939/fema\\_p\\_956\\_living\\_with\\_dams.pdf](https://www.fema.gov/media-library-data/20130726-1845-25045-7939/fema_p_956_living_with_dams.pdf).

15. *Water Resources Infrastructure*, AM. SOC’Y OF CIVIL ENG’RS, <https://www.asce.org/advocacy/water-resources/> (last visited Oct. 22, 2018).

16. *Id.*

17. *Living with Dams: Know Your Risks*, *supra* note 13.

18. See *The Cost of Rehabilitating Our Nation’s Dams: A Methodology, Estimate & Proposed Funding Mechanism*, *infra* note 43; see *The State of U.S. Infrastructure*, *infra* note 10.

efforts to (1) finance maintenance and rehabilitation projects;<sup>19</sup> (2) reduce risks to the public;<sup>20</sup> (3) plan and prepare for emergencies;<sup>21</sup> (4) establish regulatory authority;<sup>22</sup> and (5) increase public knowledge of existing safety risks.<sup>23</sup>

Dams have played an integral role in the development of the United States by providing numerous benefits. However, several episodes in American history illustrate how dam failure has been the cause of death and destruction.<sup>24</sup> Devastating consequences caused by previous dam failures initiated the passage of federal and state legislation addressing dam safety. This paper contemplates the successes and failures of those efforts and also explores recommendations for ways to address funding deficiencies and emergency planning concerns.

By first highlighting the numerous benefits of properly functioning dams and providing a brief legislative history, the vital role dams play in the United States becomes apparent. Next, a review of the basic regulatory framework for dam safety demonstrates how private ownership is a leading cause of deficient funding for dam rehabilitation. Then, further insight is provided about the current condition of dam infrastructure, increased downstream development, and the growing number of critically vulnerable dam structures, as well as the problems dam safety officials face when attempting to address private dam ownership. A brief case study of Woodlake Dam, located in North Carolina, illustrates top concerns relating to private dam ownership. Finally, a review of recommendations for alternative funding opportunities and legislative change provides avenues for addressing the current threats dams pose to public safety. At the conclusion of this paper, the reader is informed about: the increasing public safety hazards posed by dams; the complications emergency managers face when planning for and responding to emergencies; and the necessity for legislative advocacy and information sharing.

#### BENEFITS OF DAMS

The benefits of properly maintained dams cannot be overstated. According to the Association of State Dam Safety Officials (“ASDSO”),<sup>25</sup> dams provide

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19. *Id.*

20. *Dam Ownership in the United States*, *infra* note 103.

21. See *The Cost of Rehabilitating Our Nation's Dams: A Methodology, Estimate & Proposed Funding Mechanism*, *infra* note 43.

22. *Id.*

23. *Emergency Action Planning*, *infra* note 102.

24. *Living with Dams: Know Your Risks*, *supra* note 13 at 11.

25. ASDSO is a non-profit organization that serves state dam safety initiatives and programs and the dam safety community as a whole. ASDSO is made up of many dam safety professionals, dam owners,

the United States with several life-sustaining resources.<sup>26</sup> In particular, dams are used to maximize and manage the availability of arguably the earth's most vital resource: water.<sup>27</sup> Properly maintained dams provide clean water, hydroelectricity, and recreational opportunities. In addition, dams assist in flood control, interstate commerce, and provide irrigation for agriculture in arid climates.<sup>28</sup>

Some benefits of dams are unquantifiable, like the beautification of a community, while others are fairly calculable. According to data collected by the United States Army Corps of Engineers ("USACE"), an estimated savings of \$1.7 billion is realized annually from the dams that were constructed with the assistance of the National Resources Conservation Service alone.<sup>29</sup> The USACE's reported savings were specifically calculated using: the cost benefits of reduced flooding and erosion damage; the creation of water supplies; water recreation opportunities; and the preservation of wildlife habitats.<sup>30</sup> For example, the Tennessee Valley Authority ("TVA")<sup>31</sup> owns and operates a number of dams throughout the country. TVA owned dams provide electricity and prevent approximately \$280 million in flood damage on average each year.<sup>32</sup> Furthermore, USACE owned dams contributed to \$485 billion in prevented damages from 2004 to 2013, in part by investing in flood reduction projects.<sup>33</sup> The creation and proper use of dams across the country has played no small role in allowing the United States to save billions of dollars.

Water reservoirs created by dams create water access that has a variety of domestic and industrial uses.<sup>34</sup> First, water storage, made possible by the construction of a dam, provides communities with reliable access to water. According to ASDSO, "[t]en percent of American cropland is irrigated using water stored behind dams."<sup>35</sup> Fire control is another societal benefit to

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engineers, emergency managers, contractors, and educators. About, Ass'n of State Dam Safety Officials, <https://damsafety.org/about> (last visited Nov. 18, 2018).

26. *Dams 101*, ASS'N OF STATE DAM SAFETY OFFICIALS, <https://damsafety.org/dams101> (last visited Oct. 14, 2018).

27. *Id.*

28. *Id.*

29. *Dam Safety Facts and Figures*, *infra* note 32.

30. *Dams 101*, *supra* note 25.

31. TVA is a corporate agency of the United States that serves the daily power needs of over nine million people in southeastern United States. *About TVA*, TENNESSEE VALLEY AUTH., <https://www.tva.gov/About-TVA> (last visited Nov. 19, 2018).

32. *Dams 101*, *supra* note 25.

33. *Dam Safety Facts and Figures*, U.S. ARMY CORPS OF ENG'RS, <http://www.usace.army.mil/Media/Fact-Sheet-Article-View/Article/590578/dam-safety-facts-and-figures/> (last visited Oct. 14, 2018); USACE reports that for each dollar invested in its flood damage reduction projects, eight dollars in damages is avoided. *Id.*

34. *Dams 101*, *supra* note 25.

35. *Id.*

dams.<sup>36</sup> Firefighters draft water from water reservoirs created by dams when access to fire hydrants is limited.<sup>37</sup> Additionally, dams built to create a water reservoir at the heart of a planned community can increase property value, provide desired water amenities to locals, encourage tourism, boost the local economy, and increase revenue from property taxes. The case study discussed below illustrates the significance of a well-maintained dam that creates a body of water located at the heart of a planned community.

Dams have a legitimate place in the continued effort to move toward more renewable, clean energy. According to the International Energy Agency, the United States produced seven percent of the world's hydroelectricity in 2016.<sup>38</sup> Furthermore, approximately eight to twelve percent of the power generated in the United States is produced by dams.<sup>39</sup> The use of hydropower displaces the use of nonrenewable energy and thus allows the United States to avoid burning "an additional 121 million tons of coal, 27 million barrels of oil, and 741 billion cubic feet of natural gas combined."<sup>40</sup> Reductions in burning coal for energy has an overall positive effect on the environment at large.

Transportation of freight across the United States' inland waterways is vital to the nation's commerce. The construction of dams and locks<sup>41</sup> on inland waterways constitutes an integral part of the USACE's design of waterway navigation projects.<sup>42</sup> The USACE maintains 12,000 miles of inland channels, which serve forty-one states and transports fifteen percent of the nation's freight.<sup>43</sup> Because transporting freight on inland waterways reduces the number of freight trucks on the roadways, air pollution and traffic congestion

36. *Id.*

37. Drafting is the process used by firefighters to lift water from a static water supply by pumping water into a fire truck and then used to extinguish fire. *FIREGROUND: Basics of drafting*, Video, FIRERESCUE1, <https://www.firerescue1.com/apparatus/videos/1602965-FIREGROUND-Basics-of-drafting/> (last visited Nov. 9, 2018).

38. While 7% may not sound like much, the United States was ranked as the fourth leading country to produce hydroelectricity in 2016, where China produced 28.6%, Canada produced 9.3%, and Brazil produced 9.1%. *Key World Energy Statistics*, INT'L ENERGY AGENCY, [https://webstore.iea.org/download/direct/2291?filename=key\\_world\\_2018.pdf](https://webstore.iea.org/download/direct/2291?filename=key_world_2018.pdf) (last visited Nov. 9, 2018).

39. *Dams 101*, *supra* note 25.

40. *Id.*

41. A lock is the location on a waterway that consist of at least one chamber, that is used for raising and lowering water vessels between differing water levels on a waterway. A dam using locks and canals facilitates easier navigation through waterways that vary in elevation. For more information on the characteristics of locks and chambers, see <http://www.navigationdatacenter.us/lpms/pdf/lkgenr1.pdf>. *Lock Performance Monitoring System, Glossary*, U.S. ARMY CORPS OF ENG'RS, <http://corpslocks.usace.army.mil/lpwb/f?p=121:13:17307111277918::NO::> (last visited Oct. 14, 2018).

42. *Navigation*, U.S. ARMY CORPS OF ENG'RS, <https://www.usace.army.mil/Missions/Civil-Works/Navigation/> (last visited Oct 14, 2018).

43. *Dams 101*, *supra* note 25.

is abated. All of this is possible, in part, through the proper construction and use of dams.

Given the unique and essential benefits of dams, it is no wonder that great passion is engendered on the status they hold in American society. Curiously, these vital structures are overlooked during critical decision making, particularly when making decisions about funding. Despite knowledge of the aging dam infrastructure in the United States, the federal government has yet to create a federal funding program to facilitate the rehabilitation of many of the nation's dams.<sup>44</sup> States have been equally slow in providing the funds necessary to assist dam owners in making expensive repairs to aging dam structures. Old dams do not necessarily need to be destroyed or replaced, rather the solution to realizing the full benefits of dams without undue risks can be accomplished by enforcing stringent safety regulations and making financial assistance readily available.

#### LEGISLATIVE HISTORY OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY AND DAM SAFETY

When emergencies occur in the United States, several agencies at all levels of government respond. Notably, the Federal Emergency Management Agency ("FEMA") has devoted itself to helping communities prepare for, respond to, and recover from all types of emergencies<sup>45</sup> and major disasters.<sup>46</sup> A brief reflection on America's history illustrates the need for FEMA as many private citizens, states, and local governments<sup>47</sup> often rely on FEMA for assistance when disaster strikes.

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44. *The Cost of Rehabilitating Our Nation's Dams: A Methodology, Estimate & Proposed Funding Mechanism*, TASK COMM. OF THE ASS'N OF STATE DAM SAFETY OFFICIALS, [https://damsafety.s3.amazonaws.com/s3fs-public/Cost%20of%20Rehab%20Report-2016%20Update\\_1.pdf](https://damsafety.s3.amazonaws.com/s3fs-public/Cost%20of%20Rehab%20Report-2016%20Update_1.pdf) (last visited Oct. 13, 2018).

45. "'Emergency' means any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States." 42 U.S.C. § 5122(1) (2019).

46. "'Major disaster' means any natural catastrophe (including any hurricane, tornado, storm, high water, winddriven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance." 42 U.S.C. § 5122(2) (2019). See also *FEMA: Prepared. Responsive. Committed.*, FEMA, <https://www.fema.gov/pdf/about/brochure.pdf> (last visited Nov. 15, 2018).

47. "The term 'local government' means--  
(A) a county, municipality, city, town, township, local public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government;  
(B) an Indian tribe or authorized tribal organization, or Alaska Native village or organization, that is not an Indian tribal government as defined in paragraph (6); and

Congress acknowledged that the states needed federal assistance in certain cases of emergencies and took legislative action with its first piece of disaster legislation, the Congressional Act of 1803.<sup>48</sup> Specifically, Congress initiated the Congressional Act of 1803 to provide federal assistance to a New Hampshire town after a devastating fire.<sup>49</sup> Prior to the creation of FEMA in 1979, and for many years following, various pieces of disaster response legislation was enacted in an ad hoc manner.<sup>50</sup> Piecemeal legislation created numerous federal agencies, each tasked with preventing, mitigating, and responding to different types of domestic disasters.<sup>51</sup> Coordination between various disaster response agencies proved problematic and inefficient.<sup>52</sup> Seeking to simplify federal disaster law, President Jimmy Carter issued Executive Order 12127, in April of 1979, to consolidated several “disaster-related responsibilities.”<sup>53</sup> Under President Carter’s executive order, FEMA absorbed many of the federal disaster response agencies previously created through piecemeal legislation.<sup>54</sup> Further amendments, as recent as 2003, have created the system that is in place today, which allows FEMA to provide financial and physical assistance to qualifying states and local governments.<sup>55</sup>

FEMA’s many responsibilities include exercising its authority pursuant to federal dam safety laws. However, FEMA has limited involvement because the statutory scheme of federal dam safety law places the burden on individual states to enact and enforce state-level dam safety programs. The statutory scheme is designed this way for several reasons. First, the statutory framework effectuates FEMA’s desired consistency by providing a methodical, universal approach to granting federal assistance to state and local

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(C) a rural community, unincorporated town or village, or other public entity, for which an application for assistance is made by a State or political subdivision of a State.”

42 U.S.C. § 5122(8) (2019).

48. *FEMA: Prepared. Responsive. Committed.*, *supra* note 45.

49. *About the Agency*, FEMA, *infra* note 53.

50. *FEMA: Prepared. Responsive. Committed.*, *supra* note 45.

51. *Id.*

52. *Id.*

53. Exec. Order No. 12127, 44 Fed. Reg. 19,367 (Apr. 3, 1979).

54. *About the Agency*, FEMA, <https://www.fema.gov/about-agency> (last visited Nov. 9, 2018).

55. *Id.* Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, Public Law 93-288. It created the system in place today by which a presidential disaster declaration of an emergency triggers financial and physical assistance through the Federal Emergency Management Agency (FEMA). Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, 42 U.S.C. 5121 *et seq.*, and Related Authorities United States Code, Title 42. The Public Health and Welfare, Chapter 68. Disaster Relief. In the wake of the 9/11 terrorist attacks, Congress enacted the Homeland Security Act of 2002, 107 P.L. 296, 116 Stat. 2135. The Homeland Security Act of 2002 established the Department of Homeland Security. (Homeland security act of 2002, section 101 title I). On March 1, 2003, FEMA became part of the Department of Homeland Security. (FEMA, *About the Agency*, <https://www.fema.gov/about-agency>, (last updated Mar. 26, 2018 12:51) (last visited Nov. 9, 2018)).

governments as a means of fulfilling its responsibility to provide aid to citizens.<sup>56</sup> Second, it works to provide guidance to state and local emergency management authorities on best practices when dealing with dam safety.<sup>57</sup> Finally, the statutory structure encourages local emergency response. Emergencies cause immediate harm to the local community. Thus, it is imperative that state and local emergency officials are able to respond first and fast. State and local governments lacking access to the best resources will rely too heavily on federal assistance, which will cause greater loss of life and property. However justified, the statutory framework leaves much to be desired for dam safety officials because neither private dam owners nor state and local governments have the means necessary to comply with or enforce even minimum dam safety requirements.

#### LEGISLATIVE ADVOCACY

Legislative advocacy can go a long way in addressing some of the current issues regarding dam safety. The two biggest problems dam safety officials face is a combination of the lack of financial resources and the increasing potential for risk due to dilapidating dam structures.<sup>58</sup> The ASDSO has legislative priorities, which it believes will strengthen the current statutory scheme and address the critical financial and structural issues dam owners face.<sup>59</sup> The ASDSO advocates for federal legislation that provides full funding to improve dam safety, and encourages alternative funding sources for dam rehabilitation via multijurisdictional government partnerships and private-public partnerships.<sup>60</sup> The ASDSO aims to assist states in allocating resources and budgeting for dam safety programs; ASDSO also provides state level support to strengthen networks between safety officials and improve legislative awareness on dam safety issues.<sup>61</sup> Advocates, including ASDSO, have proven successful in some aspects of legislative advocacy. In 2016, a new grant program called the National Dam Rehabilitation Program was

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56. FEMA: *Prepared. Responsive. Committed.*, *supra* note 45.

57. *Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners*, FEMA, [https://www.fema.gov/media-library-data/5b20db599c212f77fd5e85d256f471a3/EAP\\_Federal\\_Guidelines\\_FEMA\\_P-64.pdf](https://www.fema.gov/media-library-data/5b20db599c212f77fd5e85d256f471a3/EAP_Federal_Guidelines_FEMA_P-64.pdf) (last visited Oct. 22, 2018).

58. *State Performance and Current Issues*, ASS'N OF STATE DAM SAFETY OFFICIALS, <https://damsafety.org/state-performance> (last visited Oct. 13, 2018).

59. *Legislative Advocacy*, ASS'N OF STATE DAM SAFETY OFFICIALS, <https://damsafety.org/legislative-advocacy> (last visited Oct. 13, 2018).

60. *Id.*

61. *Id.*

established. According to ASDSO, however, Congress has not appropriated any funding to actually launch the rehabilitation of critical dams.<sup>62</sup>

#### THE NATIONAL DAM SAFETY PROGRAM

As alluded to in the previous section, and commonly espoused by emergency managers, all emergencies begin and end locally; thus, response should also begin and end locally.<sup>63</sup> This *localization philosophy* is enshrined in the creation of the National Dam Safety Program (“NDSP”). NDSP’s framework promotes *localization philosophy* by encouraging individual and community responsibility for dam safety.<sup>64</sup> Moreover, the NDSP inspires cooperation between governments and private stakeholders in dam safety regulation.<sup>65</sup> Specifically, the NDSP requires FEMA to work with state dam safety agencies, the Interagency Committee on Dam Safety (“ICODS”), and the National Dam Safety Board (“NDSB”).<sup>66</sup> ICODS and the NDSB are statutorily created entities intended to advise federal agencies and monitor federal dam safety programs. ICODS facilitates interagency participation and information sharing between organizations concerned with the implementation of the Federal Guidelines for Dam Safety.<sup>67</sup> Furthermore, ICODS promotes the creation and maintenance of federal programs, policies, and guidelines designed to strengthen dam operations in the interest of public safety.<sup>68</sup> The NDSB monitors the nation’s dams and advises FEMA on best practices and national dam safety policy.<sup>69</sup> In addition, the NDSP provides the rule-making authority for the development of the National Program for Inspection of Non-Federal Dams (“National Inspection Program”), which<sup>70</sup> authorizes

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62. *Id.* More information can also be found at this same source on the Levee Safety Legislation, the Watershed Dam Rehabilitation Program, and other successes of ASDSO’s legislative advocacy.

63. Joint Legislative Emergency Management Committee, *A Team Approach*, NORTH CAROLINA EMERGENCY MANAGEMENT (Nov. 14, 2013), <http://ncleg.net.documentsites/committees/JLEMOC/2013-2014%20Interim/1%20-%20November%2014,%202013/Presentations%20and%20Handouts/4-1%20Sprayberry%20-%20DEMOoverview.pdf> (last visited Nov. 14, 2018). See also Elaine Pittman, *Remember, All Disasters are Local, Says FEMA Deputy Administrator*, GOV’T TECH. (Nov. 14, 2011), <https://www.govtech.com/em/disaster/Remember-All-Disasters-Are-Local-Says-FEMA-Deputy-Administrator.html> (last visited Nov. 14, 2018).

64. *National Dam Safety Program Partners*, FEMA, <https://www.fema.gov/national-dam-safety-program-partners> (last visited Oct 11, 2018).

65. 33 U.S.C. § 467 *et seq.*

66. 33 U.S.C. § 467f(a) (2014).

67. 33 U.S.C. § 467e(b) (2014).

68. *Id.*

69. 33 U.S.C. § 467f-1 (2007).

70. 33 U.S.C. § 467f (2014). See also 33 C.F.R. § 222.6 (Authority also conferred by, The National Dam Inspection Act, Pub. L. No. 92-367 (1972), which authorizes the Secretary of the Army, acting through the Chief of Engineers, to carry out the national inspection program for non-federal dams to protect human life and property.)

the USACE to inventory dams in the United States by way of the National Inventory of Dams (“NID”).<sup>71</sup>

The NDSP provides the framework for each individual state’s dam safety program. More specifically, the federal program encourages states to implement and enforce dam safety laws through state-managed programs by providing up to fifty percent of the cost for implementation, an incentive only available if the state-managed dam safety program<sup>72</sup> meets the minimum requirements established by 33 U.S.C.S. § 467f(e). Conditional funding is common practice for the federal government because it can result in uniformity across the states. However, conditional federal funding does not solve all funding deficiencies.

Only certain dams fall within the scope of the federal government’s authority.<sup>73</sup> Only those dams that meet the specifications provided in federal statute are considered when calculating the need for federal funding. Therefore, states have no incentive to manage dams that fall outside of the federal criteria because there is no guarantee that a state’s efforts will receive federal financial support.

States instead focus energy and resources on dams that are encompassed in the federal statute. Because federal funding for a state’s dam safety program cannot exceed fifty percent of the cost to administer the program,<sup>74</sup> problems arise because the state is responsible for all dams within its jurisdiction, even those that fall outside of the federal specifications. Typically, states define “dam” more broadly than the federal government. For example, North Carolina defines dams as “any structure and appurtenant works erected

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71. 33 U.S.C. § 467d (2006). Congress authorized the United States Army Corps of Engineers to inventory dams located in the United States with the National Dam Inspection Act of 1972. The NID was reauthorized as part of the Water Resources Reform and Development Act of 2014. The NID consists of dams meeting at least one of the following criteria: (1) High hazard potential classification - loss of human life is likely if the dam fails, (2) Significant hazard potential classification - no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns, (3) Equal to or exceeds 25 feet in height and exceeds 15 acre-feet in storage, or (4) Equal to or exceeds 50 acre-feet storage and exceeds 6 feet in height.

72. 33 U.S.C. § 467j(a) (2018).

73. 33 U.S.C. § 467(3) (2016). Dams governed by the federal government are artificial barriers that are able “to impound water, wastewater, or any liquid-born material, for purposes of storage or control of water, that is” at least “twenty-five feet or more in height from (I) the natural bed of the stream channel or watercourse measured at the downstream toe of the barrier; or (II) if the barrier is not across a stream channel or watercourse, from the lowest elevation of the outside limit of the barrier; to the maximum water storage elevation or has an impounding capacity for maximum storage elevation of fifty acre-feet or more.” But levees are not covered and neither are barriers “six feet or less in height regardless of storage capacity,” nor a barrier that meets the twenty-five foot height requirement “has a storage capacity at the maximum water storage elevation that is 15 acre-feet or less.” Unless, the failure of the structure would pose a significant risk to human life or property. 33 U.S.C. § 467(3)(B) (2016).

74. 33 U.S.C. § 467j(a) (2018).

to impound or divert water.”<sup>75</sup> North Carolina’s definition of a dam is much broader than the one found in the federal statute, which means North Carolina may consider a structure a dam while the federal government does not, leaving the structure outside of the calculation for allocating federal funding. Nevertheless, North Carolina has an obligation to maintain the safe operation of all dams within its territory.<sup>76</sup>

Funding specifically allocated to rehabilitating dams is also limited by narrow legislative language. Federal funding for dam rehabilitation is limited to dams defined as “eligible high hazard potential dams.” Eligible high hazard potential dams, as defined by the NDSP, are identified as non-federal dams “located in a State with a State dam safety program,” are “classified as ‘high hazard potential’ by the State dam safety agency,” and have a state-approved emergency action plan.<sup>77</sup> A dam must also have been identified by the state to be below the state’s minimum safety standards and it must “pose an unacceptable risk to the public.”<sup>78</sup>

The narrow definition of an eligible high hazard potential dam limits the number of dams eligible for federal grant monies for rehabilitation. As of October 2016, the NID contained information on approximately 90,580 dams in the United States.<sup>79</sup> Of the dams inventoried, 15,498 of them are classified as high hazard under the applicable state standard. Only 10,636 of the highest hazard dams have emergency action plans.<sup>80</sup> The statistics translate into 10,636 dams potentially eligible for federal grant monies. This number is again reduced once height and storage capacity restrictions are considered. Further exclusions are applied once ownership and primary dam function are inserted into the equation.<sup>81</sup> This leaves numerous dams ineligible for much-needed federal money for dam rehabilitation.<sup>82</sup> Therefore, the majority of the nation’s dams lack the coverage of federal grant money, which in turn creates a pressing need for stable financial assistance, particularly for private dam owners.

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75. N.C. GEN. STAT. § 143-215.25 (2019).

76. State agencies have regulation authority over more than 80% U.S dams. *Living with Dams: Know Your Risks*, *supra* note 13.

77. Emergency Action Plans are discussed in more detail below.

78. 33 U.S.C. § 467(4)(A)(iv)(II) (2016).

79. *National Inventory of Dams*, U.S. ARMY CORPS OF ENG’RS, [http://nid.usace.army.mil/cm\\_apex/f?p=838:5:0::NO](http://nid.usace.army.mil/cm_apex/f?p=838:5:0::NO) (last visited Oct. 19, 2018).

80. *Id.*

81. 33 U.S.C. §§ 467(3)-(4) (2016).

82. *See* 33 U.S.C. § 467j (2018) (A statutory framework of the allocation of grant money under the National Dam Safety Program).

## AUTHORITY AND SIGNIFICANCE OF NORTH CAROLINA DAM SAFETY LAWS

North Carolina is one of the forty-nine states that have a state-level dam safety program.<sup>83</sup> North Carolina passed the Dam Safety Law of 1967, “in the interest of public health, safety, and welfare.”<sup>84</sup> This law created a certification and inspection process for certain North Carolina dams.<sup>85</sup> These certification and inspection guidelines strive to reduce the risk of dam failure, prevent loss and injury to life and downstream property, and ensure the preservation of valuable reservoir storage and minimum stream flows.<sup>86</sup> Furthermore, state agencies work together to enforce North Carolina’s Dam Safety Law. The two primary state agencies responsible for setting and enforcing dam safety standards are the North Carolina Department of Environmental Quality (“NCDEQ”), and the North Carolina Environmental Management Commission (“NCEMC”).<sup>87</sup>

The NCDEQ is vested with authority to enforce North Carolina’s environmental laws, including the Dam Safety Law of 1967.<sup>88</sup> The NCDEQ is the state agency responsible for reviewing construction applications for projects affecting jurisdictional water, supervising the maintenance and operation of dams, and inspecting jurisdictional and non-jurisdictional dams within the State. Furthermore, the NCDEQ is the primary enforcement agency of North Carolina’s dam laws. This agency carries out its responsibilities by monitoring for emergencies, taking enforcement action when necessary, and notifying dam owners of statutory violations and the status of permit applications.<sup>89</sup>

The NCEMC has the authority to create “standards for the maintenance and operation of dams” within its jurisdiction and has the authority to modify applicable safety standards.<sup>90</sup> Modification of safety standards contemplates minimum stream flow requirements, structure type and location, and the potential hazards which certain dams pose to the public, including the “peril of life and property in the event of failure of a dam to perform its function.”<sup>91</sup>

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83. Currently, Alabama remains the only United States State without a dam safety regulatory program. *Legislative Advocacy*, ASS’N OF STATE DAM SAFETY OFFICIALS, <https://damsafety.org/legislative-advocacy> (last visited Nov. 19, 2018).

84. N.C. GEN. STAT. § 143-215.24.

85. N.C. GEN. STAT. § 143-215.25(1) defines “[d]am” as “[a] structure and appurtenant works erected to impound or divert water.” But not all dams in the State are covered under the Dam Safety Act of 1967. See N.C. GEN. STAT. § 143-215.24A.

86. N.C. GEN. STAT. § 143-215.24. “Minimum stream flow” is a quantity and quality standard set by the North Carolina Department of Environmental Quality (“DEQ”). DEQ sets the minimum stream flow standard to ensure sufficient water quality, compliance with applicable laws, and maintenance of the aquatic habitat of the affected stream. N.C. GEN. STAT. § 143-215.25(2).

87. N.C. GEN. STAT. §§ 143-215.23-215.37.

88. *Id.*

89. *Id.*

90. N.C. GEN. STAT. § 143-215.31(a).

91. *Id.*

Under its authority, the NCEMC has the ability to bring more dams within NCDEQ's jurisdiction by adjusting rules and regulations to encompass more dams within North Carolina. Furthermore, the NCEMC determines a dam's hazard potential through a classification system.<sup>92</sup> Generally, dams are classified based on the level of potential hazard to people and property in downstream communities.<sup>93</sup> An increase in concentrated material wealth in downstream development directly correlates to an increased number of dams classified as having higher risks of loss of life and property.

Inconsistencies with state and federal legislation, lack of funding, and increased downstream material wealth are not the only contributors to the increased threat dams pose. Aging infrastructure and outdated technology also contribute to the public threat posed by many dams in the United States. ASDSO reports that from 1998 to 2015, the number of deficient dams rose by 137% in the United States.<sup>94</sup> By 2017, there were more than 2,100 high-hazard potential dams in deficient condition nationwide.<sup>95</sup> North Carolina dams are on par with national dam statistics. Of the 3,862 dams inventoried in North Carolina's dam inventory, twenty-nine percent are classified as high-hazard.<sup>96</sup> Ten percent of high-hazard dams in North Carolina are deficient and only twenty-eight percent of high-hazard dams within the State have emergency action plans that meet FEMA guidelines.<sup>97</sup> Furthermore, one-third of the dams in North Carolina are more than fifty years old.<sup>98</sup> Thus, the existing high-hazard potential across North Carolina demands greater resource allocation.

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92. N.C. GEN. STAT. § 143-215.31(a1). North Carolina dams are classified into three categories. Dams identified as Class A are those "dams located where failure may damage uninhabited low value nonresidential buildings, agricultural land, or low volume roads. 15A N.C. ADMIN. CODE 2K.0105(a)(1). Class B dams are those situated where "failure may damage highways or secondary railroads, cause interruption of use or service of public utilities, cause minor damage to isolated homes, or cause minor damage to commercial and industrial buildings." 15A N.C. ADMIN. CODE 2K.0105(a)(2). Finally, Class C dams are those "located where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads." 15A N.C. ADMIN. CODE 2K.0105(a)(3).

93. See *id.*

94. *Legislative Advocacy*, ASS'N OF STATE DAM SAFETY OFFICIALS, <https://damsafety.org/legislative-advocacy> (last visited Oct. 13, 2018). Dams in deficient condition are dams with structural or hydraulic deficiencies that leave the structure vulnerable to failure.

95. *Id.*

96. *About ASCE*, 2017 Infrastructure Report Card, AM. SOC'Y OF CIVIL ENG'RS, <https://www.infrastructurereportcard.org/making-the-grade/about-asce/> (last visited Oct 13, 2018).

97. *Id.*

98. *Id.*

TOP ISSUES DAM SAFETY AND EMERGENCY MANAGEMENT OFFICIALS  
FACE

The safe operation and timely maintenance of dam structures are key to avoiding dam disasters. Partial and complete dam failures cause loss of life and property and have severe economic and environmental impact, particularly to highly developed downstream communities. Dam safety officials and emergency managers protect against these harms by implementing policies and guidelines to prevent, mitigate, and respond to emergencies. However, safety officials often run into a few common issues in regards to dam safety.

The lack of financing for maintenance and repair of existing dams are of particular concern. A majority of the dams located in the United States are privately owned; many private owners do not have the financial ability to keep up with costly maintenance and repair work. Nationwide, dams have not been properly maintained. Now, many dams across the United States pose an increased hazard because current dam infrastructure is at a critical state. Many dam structures do not meet current safety standards, increasing the risk of failure.

Despite all levels of government investment in dam safety, private ownership hampers the efforts of emergency managers to adequately prevent, plan, and prepare for emergencies. Private dam owners assume responsibility for all dam maintenance, repairs, and upgrades.<sup>99</sup> As dams age, maintenance, repairs and upgrades become increasingly more expensive.<sup>100</sup> As mentioned, most dams in the United States are “well beyond their 50-year design life.”<sup>101</sup> Accordingly, many private dam owners lack the financial capital needed for satisfactory maintenance.<sup>102</sup> The lack of financial ability leaves many privately owned dams in a deteriorating condition—susceptible to failure.

Emergency Action Plans, more commonly known as EAPs, are the best tool emergency managers have for planning and preventing significant loss due to dam failures or incidents. EAPs are helpful for emergency response actions, but they do have their limitations. The biggest limitation is the cost to implement and maintain EAPs. According to dam safety officials, most dam owners do not have an EAP because of financial inability.<sup>103</sup> The issues that dam safety officials and emergency managers face are circular. Each issue, such as lack of public awareness, circles back to the lack of financial

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99. *Id.*

100. *Id.*

101. *About ASCE*, supra note 95.

102. *Living with Dams: Know Your Risks*, supra note 13.

103. *Emergency Action Planning*, ASS'N OF STATE DAM SAFETY OFFICIALS, <https://damsafety.org/dam-owners/emergency-action-planning#Introduction%20to%20EAPs> (last visited Nov. 13, 2018).

resources, which contributes to inadequate emergency preparedness and failure to have EAPs for several high-risk potential dams. Since the lack of emergency preparedness is a threat to public safety, it is imperative that creative solutions are offered for the financial issues facing the dam safety community.

#### DAM OWNERSHIP IN THE UNITED STATES

The actual ownership of United States infrastructure is often unknown or ignored by the public. People rely heavily upon public infrastructure because it is the underlying foundation and fundamental framework of a community's functionality. A majority of infrastructure in the United States, like highways, bridges, and sewer systems, is government owned.<sup>104</sup> Dams in the United States, however, are predominantly privately owned infrastructures.<sup>105</sup> According to data collected by the NID, FEMA determined that 56.4% of dams in the U.S are privately owned.<sup>106</sup> The remaining 43.6% breaks down as follows: the federal government owns 4.7%; states own 4.8%; local governments own 20.1%; public utilities own 2.4%; and ownership of 11.6% is undetermined.<sup>107</sup> As the statistics suggest, federal, state, and local governments own less than thirty percent of the nation's dams combined.<sup>108</sup>

The wide range in dam ownership demonstrates that dam safety and security is not the exclusive responsibility of the government.<sup>109</sup> Private dam owners are legally responsible for potential risks created by their dams.<sup>110</sup> Regardless of ownership, however, the state in which a dam is located has the fundamental responsibility of protecting its citizens and their respective property interests.<sup>111</sup> Dam safety and security affects not only people and property located within a close proximity to a dam, but those far away as well.<sup>112</sup> An incident threatening a dam's integrity (including negligent maintenance) has the potential to cause devastating and far-reaching loss and injury, crossing local, state, and national borders.<sup>113</sup> The potential for extreme

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104. *Dam Ownership in the United States*, FEMA, <https://www.fema.gov/dam-ownership-united-states> (last visited Nov 16, 2018).

105. *Id.*

106. *Id.*

107. *Id.*

108. *Id.*

109. *Id.*

110. 33 C.F.R. § 222.6(g)(1)(i).

111. 33 C.F.R. § 222.6(g)(1)(ii).

112. *Dam Ownership in the United States*, *supra* note 103.

113. *Id.*

harm demands attention from private citizens, dam owners and non-owners alike, and every level of government.

#### INFRASTRUCTURE

A nation's infrastructure is critical to its long-term resiliency and growth. Because infrastructure is crucial to the success and safety of America, the American Society of Civil Engineers ("ASCE")<sup>114</sup> has made advocacy for sustainable infrastructure one of its strategic initiatives.<sup>115</sup> To that end, the ASCE releases an infrastructure report card every four years, which rates America's infrastructure.<sup>116</sup> The ASCE's infrastructure report card offers a way to determine the quality of the nation's infrastructure in a digestible and familiar format by assigning letter grades to each category of infrastructure (i.e. aviation, bridges, energy, schools, transit, wastewater, etc.).<sup>117</sup> The ASCE's report card communicates a comprehensive, category-specific overview of the nation's current performance in developing, maintaining, and constructing infrastructure.<sup>118</sup> The ASCE takes its assessment a step further by also including recommendations for how to improve each of the sixteen categories that the report card evaluates.<sup>119</sup> In addition, ASCE releases state-specific report cards that are released on a rolling basis.<sup>120</sup> Despite some incremental progress, the nation's overall infrastructure is less than impressive; in fact, it is quite alarming.

#### CURRENT STATUS OF DAM INFRASTRUCTURE (D IS FOR DAMS)

Sound dam infrastructure is necessary to realize the full benefits dams can provide.<sup>121</sup> The United States has long utilized dams as a vital mechanism for development, leading dams to become a "monumental presence of the American landscape."<sup>122</sup> The poor condition of the nation's dams, however,

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114. The ASCE, the nation's oldest engineering society, was founded in 1852. *About ASCE*, *supra* note 95.

115. *ASCE Issues & Advocacy*, AM. SOC'Y OF CIVIL ENG'RS, [https://www.asce.org/issues\\_and\\_advocacy/](https://www.asce.org/issues_and_advocacy/) (last visited Oct. 14, 2018).

116. *About ASCE*, *supra* note 95.

117. *Id.*

118. *Id.*

119. *Id.*

120. *State by State Infrastructure*, 2017 Infrastructure Report Card, AM. SOC'Y OF CIVIL ENG'RS, <https://www.infrastructurereportcard.org/state-by-state-infrastructure/> (last visited Oct. 14, 2018).

121. *Dams*, 2017 Infrastructure Report Card, AM. SOC'Y OF CIVIL ENG'RS, <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Dams-Final.pdf> (last visited Oct. 14, 2018).

122. Christine Macy, *Dams Across America*, PLACES J. (Jan. 2010), *available at* <https://doi.org/10.22269/100120>; *Dams*, *supra* note 120.

prevent the full realization of potential benefits because current safety standards are vastly unmet.<sup>123</sup>

There are several factors that contribute to the neglected status of dam infrastructure in America. Aging dams that cannot keep pace with advancements in technology contribute to the deteriorating dam infrastructure in North Carolina and across the nation.<sup>124</sup> Changes in precipitation patterns, and increased downstream development play major roles in creating dangerous inadequacies in dam infrastructure. Climate change, technology, age and downstream development require safety officials to consistently review the need for safety upgrades, rehabilitation, and sometimes reclassification of a dam. FEMA reports that severe storms are not even the most common cause for dam failure.<sup>125</sup> So, even without the increased frequency in severe storms, critical dam structures pose a public threat because failure could happen at any moment without warning.

#### EMERGENCY ACTION PLANS (EAP)

One thing that all dam safety officials agree on is the significance of certain dams having EAPs. Based on the increased number of EAPs for dams, dam safety officials claim emergency preparation is improving. The ASDSO determined that the number of state-regulated high-hazard potential dams with EAPs has increased by forty-six percent since 1999.<sup>126</sup> Emergency officials aspire for all high-hazard potential dams to have an EAP.<sup>127</sup> Further, emergency officials claim that EAPs are vital to local governments in their preparation for sudden dam failure and their response to downstream devastation that occurs from unexpected floods.<sup>128</sup> EAPs are so vital to emergency planning that FEMA and ASDSO both published guidelines to assist dam owners in fulfilling this important safety measure.<sup>129</sup>

EAPs are most crucial to dams that are classified as high-hazard potential or have a significant hazard potential.<sup>130</sup> EAPs serve several purposes that can ultimately reduce the loss of life and property when responding to an emergency. For example, EAPs will increase public awareness; a typical EAP requires dam owners to share important safety information with citizens, especially those who live in flood inundation areas, describing how

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123. *Id.*

124. *State Performance and Current Issues, supra* note 48.

125. *Living with Dams: Know Your Risks, supra* note 13 at 8.

126. ASDSO reports the number of dams with an EAP increased from 35% in 1999 to 81% in 2017. *State Performance and Current Issues, supra* note 48.

127. *Id.*

128. *Id.*

129. *Emergency Action Planning, supra* note 88.

130. *Id.*

citizens can take measures to reduce their risks of loss or harm.<sup>131</sup> EAPs also help to inform dam owners of their own personal liability for downstream damage.<sup>132</sup> However, it is becoming apparent that many dam owners choose not to implement EAPs, even when mandated by state law, due to costs and a lack of full understanding regarding personal liability.<sup>133</sup> Therefore, EAPs are only as helpful for emergency preparedness as states mandate through enforcement and exercising authority pursuant to state laws.

Mandating EAPs for certain risk level dams is a good start to developing emergency preparedness. Enforcement, however, is the follow through necessary to truly prevent loss of property and loss of life from dam disasters. EAPs are remarkably effective in protecting against loss of life and property only when the EAP is obtained, implemented, and understood by dam owners and local responders.

#### CASE STUDY: WOODLAKE DAM

Dam safety officials use case studies to learn from past mistakes and inform best practices. The case study of Woodlake Dam illustrates the issues surrounding private dam ownership, financial insecurities, and inadequately maintained dam structures. Lake Surf, located in Moore County, North Carolina, was formed in 1973 with the construction of Woodlake Dam.<sup>134</sup> Since its inception, Lake Surf has served as an important amenity to the community.

The Woodlake Dam, which was necessary to form Lake Surf, was built and has remained under private ownership. Lake Surf and Woodlake Dam were sold in 1980 out of a bankruptcy proceeding.<sup>135</sup> The new owner, Ingolf Boex, realized financial hardships during his ownership of Woodlake Dam and bankruptcy proceedings followed again.<sup>136</sup> Thus, the lake and dam were auctioned in March of 2015 to a subsidiary of the bankrupt owner, and operations continued under the same management. Ownership reorganized in this

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131. *Id.*

132. *Id.*

133. *Id.* North Carolina's dam safety laws makes a violation of those laws a criminal offense. One state dam safety law requires an EAP for particular dams with higher risk potential. Thus, a dam owner who fails to obtain an EAP could be found guilty of a misdemeanor and obligated to pay associated fines.

134. *Lobelia Quadrangle, North Carolina, 7.5 Minute Series*, Map, U.S. GEOLOGICAL SURVEY (2016), <https://viewer.nationalmap.gov/basic/?basemap=b1&category=histopo,ustopo&title=Map%20View#startUp> (search location field for "Lobelia, North Carolina") (last visited May 1st, 2019).

135. *Woodlake Facts*, Save Woodlake, <http://www.savewoodlake.com/woodlake-background/> (last visited Nov. 19, 2018).

136. *Id.*

manner to evade financial responsibilities and to keep an ownership interest in both the lake and dam.<sup>137</sup>

Numerous inspections by state officials revealed structural deficiencies, and a Notice of Deficiency (“NOD”) was issued to the dam owner each time a deficiency was identified. NODs were issued to Woodlake Dam owner as early as 1996 and continued through 2014.<sup>138</sup> Despite the issuance of numerous NODs, repair plans to address deficiencies were never initiated. A specific example of this occurred over the course of several months. A Dam Safety Order (“DSO”) was issued on December 15, 2014, and a second followed on July 27, 2015.<sup>139</sup> The DSOs required the owner to initiate approved plans for repair within ninety-one days or submit new plans for a temporary controlled breach of Woodlake Dam.<sup>140</sup> The dam owner took no significant action on either of the DSOs.<sup>141</sup>

Hurricane Matthew hit the Moore County area on October 10, 2016.<sup>142</sup> As a result of the hurricane, a portion of a concrete spillway collapsed on the dam.<sup>143</sup> Emergency measures were taken to protect against the potential imminent and catastrophic harm to the public.<sup>144</sup> The National Guard was recruited to reinforce portions of the concrete spillway,<sup>145</sup> and this action successfully prevented complete dam failure. However, local emergency management still evacuated the downstream community pursuant to the implemented EAP.<sup>146</sup>

Hurricane Matthew exacerbated the dam’s already deficient condition, and these major deficiencies called for emergency repair construction to Woodlake Dam.<sup>147</sup> The owner contracted with an engineering company, Geosyntec, to conduct the necessary interim repairs from the damage caused by Hurricane Matthew.<sup>148</sup> The owner, however, failed to pay Geosyntec under the terms of its contract,<sup>149</sup> leading Geosyntec to terminate the contract and leave Woodlake Dam in disrepair.

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137. Lisa Sorg, *New Boss Same as the Old Boss: Document Trial Shows Convolutions of Woodlake Dam Ownership*, NC POLICY WATCH, (Nov. 19, 2018), <http://pulse.ncpolicywatch.org/2017/06/18/new-boss-old-boss-document-trail-shows-convolutions-woodlake-dam-ownership/>.

138. Consent Judgement at 4-7, *State of N.C., ex rel., v. Woodlake CC Corp.*, 17 CVS 82 (N.C. Super. Ct., Moore Cty., 2017).

139. *Id.* at 6-7.

140. *Id.*

141. *Id.*

142. *Id.* at 7.

143. *Id.*

144. *Id.*

145. *Id.*

146. *Id.*

147. *Id.* at 8.

148. *Id.*

149. *Id.* at 10.

After repeated attempts to engage the dam owner in safety precautions, state emergency management officials realized that judicial intervention was necessary. The state sought an injunction to compel the dam owner to begin the emergency temporary breach construction on Woodlake Dam, which was granted on March 15, 2016.<sup>150</sup> Yet again, the dam owner failed to follow through on construction. The owner's failure to comply with the court order led to DEQ's emergency declaration on June 8, 2017.<sup>151</sup> The state undertook construction of a temporary full breach of Woodlake Dam in an effort to conduct a controlled release of the dammed water. DEQ's deliberate and persistent actions prevented loss of life and property. Since October 2017, the time when the construction was complete, Lake Surf has dried completely.<sup>152</sup> A twelve-hundred acre mud pit is the only remains of a forty-five year-old lake.<sup>153</sup>

With the water reservoir bare, the natural floodplain is restored in the Woodlake area. Therefore, the risk of flood is almost nonexistent for the Woodlake community. Furthermore, the downstream community is far less at risk of sudden flood. Some environmentalists and emergency managers view the reduced flood risk and restoration of a natural habitat as a desirable outcome.<sup>154</sup> There are, however, other costs associated with the partial deconstruction of the dam and the elimination of Lake Surf. For example, the elimination of Lake Surf terminates the need for high premium flood risk insurance. Despite the reduced risk of flooding, property owners in the Woodlake community continue to pay high premium flood insurance because the effective flood insurance rate map still indicates that the Woodlake community is a special flood hazard area.<sup>155</sup> Many surrounding property owners also reported hemorrhaging property values<sup>156</sup> because the central amenity, Lake Surf, has been replaced with a mudpit. Woodlake homeowners

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150. Letter from Michael S. Regan, Sec'y, N.C. Dep't Env'tl. Quality, to Latif Kaid, Dir., State Constr. Office (June 8, 2017) (electronic PDF available at [https://ncdenr.s3.amazonaws.com/s3fs-public/Energy%20Mineral%20and%20Land%20Resources/Land%20Quality/Dam%20Safety/WoodlakeDam/2017%2006%2008%20Emergency%20Declaration\\_Temporary%20full%20breach%20of%20Woodlake%20Dam.pdf](https://ncdenr.s3.amazonaws.com/s3fs-public/Energy%20Mineral%20and%20Land%20Resources/Land%20Quality/Dam%20Safety/WoodlakeDam/2017%2006%2008%20Emergency%20Declaration_Temporary%20full%20breach%20of%20Woodlake%20Dam.pdf)).

151. See Letter from Michael S. Regan to Latif Kaid, *supra* note 149.

152. Class Action Complaint & Demand for Jury Trial, *infra* note 159 p 15.

153. *Id.*

154. While the return to the natural habitat is desirable in some respects, other outcomes are less coveted. Surf Lake is home to "pinioned" swans; swans that have undergone the surgical amputation of the end of the wing. Swan that once thrived on Surf Lake are now unable to relocate to another body of water. Johan Kaplan, *Woodlake Dam Trouble Means Dry, Muddy Lake for Swans*, ABC 11 NEWS (Nov. 14, 2016).

155. The National Flood Insurance Act of 1968 regulates the amount of federal assistance participating communities have access to in the event of a flood emergency. 42 U.S.C. §§ 4001-4127 (2016). The communities surrounding Woodlake Dam are participating communities.

156. See Class Action Complaint & Demand for Jury Trial, *infra* note 159.

are not the only group significantly impacted by the breach construction. Government agencies responsible for managing floodplains and reporting relevant data are also greatly impacted. Safety officials on all levels of government have had to face difficult and novel issues as a result of the private dam owner failing to take proper action. Furthermore, financial burdens that should be placed on the private owner get shifted to taxpayers, as explained below.

North Carolina's Floodplain Management Branch is a state entity involved in ensuring the proper management of the state's watercourses. According to North Carolina's Floodplain Management Procedures, the Floodplain Management Branch conducts new studies on the entirety of North Carolina every five to ten years.<sup>157</sup> The state was preparing to "re-map" the Woodlake area but halted this process due to the uncertainty of the dam's permanent condition.<sup>158</sup> In effect, the Floodplain Management Branch allowed time for the homeowners and other interested parties to formulate plans for rebuilding the dam and impounding Lake Surf.<sup>159</sup> The delay in re-mapping the area for floodplain planning has caused further delays for sharing technical information between local, state, and federal government agencies. This delay prevents the most accurate information from being obtained and used for that particular area, which is not desirable for risk management officials.

Litigation costs are another expense incurred. As previously mentioned, dam owners are liable for negligent upkeep and for environmental, economic, and personal damage caused by dam failure or dam incidents. Homeowners and members of Woodlake Country Club initiated a class action lawsuit in Moore County Superior Court to recover damages from the dam debacle.<sup>160</sup> As a result of the lawsuit, the judge awarded \$161 million in damages to the plaintiff class.<sup>161</sup> In addition, North Carolina is pursuing further legal action against the private owner to recoup the cost of the breach construction which totals approximately \$1.2 million.<sup>162</sup> The private dam owner is also facing litigation from two engineering companies for nonpayment in relation to Woodlake Dam construction contracts in excess of \$367,000.<sup>163</sup> The private

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157. Interview with John D. Brubaker, NFIP Coordinator, N.C. Dep't of Pub. Safety, Risk Mgmt. Section (Jan. 2018).

158. *Id.*

159. *Id.*

160. See Class Action Complaint & Demand for Jury Trial, *Jones v. Woodlake CC Corp.*, (CVS \_\_\_), (Oct. 23, 2017).

161. Jaymie Baxley, *Judge Awards \$160M in Woodlake Lawsuit*, THE PILOT, Mar. 22, 2018, available at [http://www.thepilot.com/news/judge-awards-m-in-woodlake-lawsuit/article\\_0c977b40-2dfc-11e8-aa94-a3726e66fec1.html](http://www.thepilot.com/news/judge-awards-m-in-woodlake-lawsuit/article_0c977b40-2dfc-11e8-aa94-a3726e66fec1.html).

162. *Id.*

163. *Id.*

dam owner blames noncompliance on financial difficulties.<sup>164</sup> As financial difficulties pile up for the private owner of Woodlake Dam, it is all but certain that proper repair will not occur anytime soon.

The case study of Woodlake Dam provides an illustration of the current issues facing the dam safety community. Private ownership issues around financial instability has a direct cost to the community because taxpayers ultimately bear the burden of litigation costs. Here, a private owner has successfully avoided, or at least limited, liability through countless restructurings and bankruptcies. Litigation costs incurred by the state will likely exceed any potential award received by the plaintiff. Thus, the personal liability, which is supposed to be incurred by the private owner, is unfortunately shifted to taxpayers.

#### RECOMMENDATIONS

Many possible solutions to the increased hazard potential and funding deficiencies exist. ASDSO prioritized legislative advocacy as a mechanism to address issues facing dam safety officials. Legislative advocacy aims to address dam safety concerns on both the federal and state level. In addition, proposed legislation focuses on alternative funding options, raising public awareness, increasing dam owners' understanding of liability, encouraging stricter enforcement of current laws, and creating new restrictive regulations.

One of ASDSO's legislative priorities is exploring creative funding alternatives at the state level. ASDSO formed a task group specifically charged with preparing a report on rehabilitation costs for United States dams.<sup>165</sup> In 2016, the ASDSO task force updated its report to reflect updated cost data estimating the current figures for full dam infrastructure rehabilitation.<sup>166</sup> The ASDSO estimates that \$60.7 billion is needed to repair non-federally owned dams and another \$18.71 billion is necessary to rehabilitate non-federal dams that are classified as high-hazard in the United States.<sup>167</sup> The ASDSO report further estimates that rehabilitation of non-federal dams in North Carolina is \$1,933,000.<sup>168</sup> Due to these estimates, ASDSO suggests that implementation of state assistance loan programs will provide dam owners the ability to rehabilitate dam structures.<sup>169</sup> Furthermore, private-public partnerships have the potential to take state assistance loan programs a step further. These

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164. *Id.*

165. *The Cost of Rehabilitating Our Nation's Dams: A Methodology, Estimate & Proposed Funding Mechanism*, *supra* note 43.

166. *Id.*

167. *Id.*

168. *Id.*

169. *Id.*

partnerships can work to put dam owners in a position to realize long-lasting economic benefits. Long-term economic benefits will create sustainable wealth for dam owners, which will increase independent financial stability. Providing sustainable cash-flow for dam owners to generate from dam ownership alone will allow other dam owners access to state loan assistance money in the future.

Another possible solution is for states to enact statutes that provide step-by-step guidelines for implementing a contract-seeking program, whereby the state seeks to contract with private owners to upgrade dams, providing beneficial terms to both parties. Such contracts must be voluntary and likely will not address all private dam owners. If a contract with the state can limit or reduce the likelihood of potential liability for a private dam owner, the dam owner will have a built-in incentive to engage in a contract with the state. The contracts would not alleviate the dam owner's liability, and contract terms would be negotiated differently for each contract. The essential purpose of the contract would allow the state to engage in a dollar-for-dollar match with the private owner on the cost of upgrades and repairs to existing dams. The public money would come from a statutorily created trust, built up by the collection of permitting and processing fees associated with dam construction, fines collected for violations of the dam safety laws, and general infrastructure funds. The contract would also include protection for the state by including some type of security interest in the land, granting the state certain rights in the event of default.

However, some owners may choose to take the gamble of hoping their dam holds fast while they own it, or that the cost of litigation following a dam failure would prove less than the cost of repairing the dam in the first place. Others may assert that a contract with a private entity would be more appealing than operating under the auspices of the state. It is unlikely, however, that a private contract would offer the dam owner a fifty percent discount, which is essentially the operation of a contract with the state. Thus, a contract with the state has the potential to be exponentially appealing for private dam owners that are in need of financial assistance for maintenance and upgrades because it offers financial assistance, reduction in future liabilities, and in some cases the ability to avoid filing for bankruptcy.

North Carolina can implement a contract-seeking program with private dam owners by taking advantage of work that is already being done around the state. Currently, the N.C. Dam Safety Law authorizes inspectors to enter private property in order to conduct inspections of all dams in the state (even those not in the jurisdiction of the law due to classification or ownership).<sup>170</sup>

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170. N.C. GEN. STAT. § 143-215.24.

The current statutes also require inspectors to report findings on the dam's conditions to the North Carolina dam inventory.<sup>171</sup> With the new program, through the inspections already being conducted, state agents can identify whether a dam falls into one of two categories: (1) the dam is not performing any essential purpose to the community, nor is it generating a profit to the dam owner, and it is unlikely that the dam could undergo construction that would greatly change its purpose or profit generation; or (2) the dam is a priority dam that needs construction and it is apt for a significant use, or if the dam is in a great location for the sell of membership access for recreational use, or if the dam can be made useful and profitable to the private dam owner in some way. Private and public parties share the financial burden and benefits. The private owner can generate some type of money on the new use, a portion of which could be allocated to the statutory trust fund used for the rehabilitation and maintenance of dams across the state. Ideally, state officials can proactively address dam safety concerns without waiting for an emergency to occur. Legislation motivated by the desire to strengthen our state's infrastructure rather than legislation placing the burden on emergency officials to respond in critical time-sensitive situations allows better allocation of resources, more precise risk assessment, and ultimately reduces the loss of life and property.

In addition, federal legislative change has the potential to address the increased hazards of dilapidated dam infrastructure. Replicating disclosure requirements for dam owners and operators, like those found in the Emergency Planning and Community Right to Know Act ("EPCRA"), will address the current lack of public awareness and also increase understanding of personal liability for dam owners. EPCRA was enacted in response to concerns about the handling and storage of toxic chemicals<sup>172</sup> and for the purpose of increasing public knowledge and access to information regarding hazardous materials.<sup>173</sup> Public awareness about dams will increase by enacting state legislation mirroring the EPCRA.

Congress addressed environmental concerns with the passage of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). CERCLA created the "Superfund" as a trust fund dedicated to covering the clean-up cost of "abandoned or uncontrolled hazardous waste sites."<sup>174</sup> The Superfund generated funds through the collection of a special

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171. *Id.*

172. 42 U.S.C. §§ 9601-9675 (2018); See also *What is EPCRA?*, EPA, <https://www.epa.gov/epcra/what-epcra>, (last visited Nov. 19, 2018).

173. *Id.*

174. *Superfund: CERCLA Overview*, EPA, <https://www.epa.gov/superfund/superfund-cercla-overview>, (last visited Nov. 19 2018).

tax placed on parties that contributed to the creation of hazardous waste.<sup>175</sup> Replicating the statutory scheme of CERCLA is one of many ways to generate money to address a public harm. As it follows, replicating CERCLA to create a federal fund specifically addressed at generating money to rehabilitate United States dams will go a long way toward reducing future costs of major weather events and assisting emergency managers and dam safety officials in protecting against preventable harms to the public.

#### CONCLUSION

There are several ways to address the strain private dam ownership creates on overall dam health. While some solutions are novel, others are a mere recreation of existing legislative solutions used to address other environmental concerns. Whether the wheel needs to be recreated, or simply set to mirror other evidence-based solutions, the fact remains that action is necessary to prevent further loss of life, unnecessary financial burden on the public, and to enhance the ability to prevent, plan for, mitigate, and respond to dam disaster before we all get swept away.

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175. 42 U.S.C. § 101(11) (2018).