12. Attachments

2018 SHMP Appendices

Attachment No.	Title
Attachment 12.1	2013 Legacy State Hazard Mitigation Plan
Attachment 12.2	Other Hazards
	12.2.1 Dam Failure
	12.2.2 Public Health
Attachment 12.3	

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ATTACHMENT 12.2.1 Legacy 2013 SHMP

The 2013 SHMP is too large to attach to this plan. The legacy plan is located at:

http://ready.alaska.gov/Plans/mitigationplan

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Attachment 12.2 Other Hazards

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12.2.1 Dam Failure

12.2.1.1 Hazard Characteristics

Alaska Statute 46.17.900(3) defines a dam as, "an artificial barrier and its appurtenant works, which may impound or divert water." To be regulated as a dam under state jurisdiction, a barrier must meet at least one of the following three descriptions listed in the statute:

1. Have an impounding capacity at maximum water storage elevation of 50 acre-feet and be at least 10 feet tall measured from the lowest point at either the upstream or downstream toe of the dam to the crest of the dam
2. Be at least 20 feet tall measured from the lowest point at either upstream or downstream toe of the dam to the crest of the dam regardless of its storage capacity
3. Pose a threat to lives and property in the event of a failure or improper operation of the dam or barrier

Dams owned or operated by the federal government or regulated by the Federal Energy Regulatory Commission are exempt from state jurisdiction, in addition to artificial barriers that fail to meet the statutory definition of a dam.

Dams in Alaska

At present, there are 180 dams listed on the Alaska Dam Inventory database at the Alaska Department of Natural Resources (ADNR), including state, federal and non-jurisdictional dams (Figure 12-1). Some non-jurisdictional and federal jurisdictional dams, constructed since the original inventory was compiled in the early 1980s, are not listed or represented on the graph.

Alaska dams exist for many purposes that include:

- Hydroelectric
- Water supply
- Flood control and storm water management
- Recreation
- Fish and wildlife habitat
- Fire protection
- Mine tailings and contact water storage

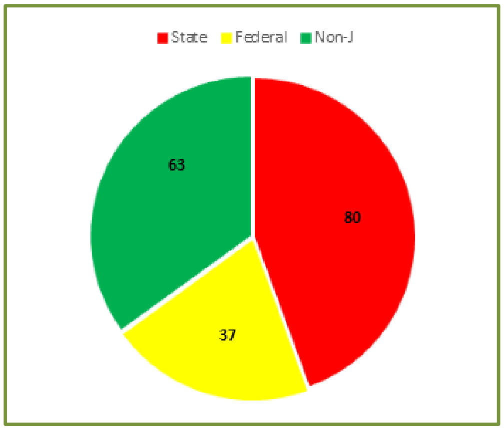

Figure 12-1 Alaska Dam Inventory Jurisdictions

The Alaska Dam Safety Program (ADSP) is responsible for supervising the safety of the 80 dams under state jurisdiction, which includes issuing *Certificates of Approval* for new dam construction and for existing dams' operation, repair, modification, removal or abandonment.

Dam Hazard Potential Classification

All dams are classified according to their potential impacts from catastrophic failure; referred to as their "hazard potential" classification. The hazard potential only describes dam failure consequences, but provides no information on the condition of a dam or its failure likelihood. The hazard potential classification assigned to a structure in Alaska is based on one of three categories (Table 12-1) described in the current dam safety regulations (11 AAC 93.157):

Table 12-1 Hazard Potential Classification Consequences

Classification	Threat Level	Defined
Class I	High	If the department determines that the failure or improper operation of the barrier will result in probable loss of human life
Class II	Significant	If the department determines that the failure or improper operation of the barrier will result in
		(A) A significant danger to public health
		(B) The probable loss or significant damage to homes, occupied structures, commercial property, high-value property, major highways, primary roads, railroads, or public utilities, other than losses or damage limited to the owner of the barrier or
		(C) Other probable significant property losses or damage, other than losses or damage limited to the owner of the barrier; or
		(D) Probable loss of or significant damage to waters identified under 11 AAC 195.010(a) as important for the spawning, rearing, or migration of anadromous fish; or
Class III	Low	If the department determines that the failure or improper operation of the barrier will result in
		(A) Limited impacts to rural or undeveloped land, rural or secondary roads, and structures;
		(B) Property losses or damage limited to the owner of the barrier; or
		(C) Insignificant danger to public health.

An artificial barrier that is assigned a Class I (high) or Class II (significant) hazard potential is considered to "pose a threat to lives or property" and meet the statutory definition of a dam regardless of its geometry.

Alaska dam's hazard potential classification is based on jurisdictional status as shown in Figure 12-2. In general, the Class I dams are located in major urban areas of Alaska such as Anchorage, Juneau, Ketchikan, and Kodiak. Class II dams are located across the state and include the major tailings storage facilities at the Fort Knox and Red Dog mines.

The Alaska dam safety regulations require Class I and Class II dams to have an emergency action plan (EAP), which should include a map of the potential inundation zone in the case of a dam breach. Because of the cost of developing these maps, many of the dams do not have dam breach inundation area maps. In practice, the inundation map is only required for Class I dams in Alaska; however, existing inundation map quality is limited.

Table 12-2 lists Alaska's federal, state, and other owner managed and regulated dams.

Table 12-2 Agency Regulated Dam's Hazard Classifications

Regulating Jurisdiction	Class I High Hazard	Class II Significant Hazard	Class III Low Hazard	*Total Each Jurisdiction*
State	17	40	23	***80***
Federal	7	5	25	***37***
Non-Jurisdictional	--	--	62	***62***
Unknown	--	--	1	***1***
Total	**24**	**45**	**111**	***180***

Source: DNR, Alaska Dam Safety Office

12.2.1.2 Dam Failure History

There have been several dam failures in Alaska's history, but no catastrophic failures since the legacy 2013 SHMP was implemented. Table 12-3 provides a short representative sample list.

Table 12-3 Alaska's Historical Dam Failure Events

Date	Location	Structure Name / Type	Damage Description
2018	Hydaburg, Prince of Wales Island	Hydaburg Water Supply Dam	Currently experiencing progressive failure and is at risk of total collapse. Efforts to mitigate this situation are in progress.
2014 - 2017	Ouizinkie 's Spruce Island (water supply reservoir)	Mahoona Dam Wooden Timber	Structure became degraded to the point that an emergency replacement occurred in 2014
			Ice damaged the new dam's low-level outlet causing the reservoir to drain completely, and additional emergency repairs were completed in 2017.
2000 - 2007	Kake	Gunnuk Creek Dam	Structural failure caused reservoir drainage and severe economic impact to the community.
1972	Anchorage	Lake o' the Hills Dam	Dam failed. Possibly resulting in the death of a child who was swept into a culvert.

The most recent dam failure event occurred in July 2000 when the city of Kake's main water supply dam failed. After the dam failed, the small reservoir drained quickly and the town became acutely aware of the importance of the dam.

Significantly impacted, Kake was forced to find a temporary and long-term solution to provide water to the 800-person village. The water supply loss was the most apparent impact. The local processor lost production for the next 2 weeks occurring at the peak of the fishing season. The hatchery experienced an increased egg and fry mortality rate due to water quality problems. No one was injured when the dam failed, but the hatchery experienced some damage to their access road. After the dam failure, a child was severely scalded by boiling water in a kitchen accident later in the week, while trying to make the water safe to use.

The city of Kake's Dam failure had a truly significant impact on the entire community. The response to this disaster included local residents and government entities, businesses, state agencies, and the federal government. The initial economic impact to the community was estimated at approximately $2 million, not including dam replacement. The budget for a new, replacement dam planned by the Army Corps of Engineers was approximately $10 million. Construction of the new dam was completed and operations began in April of 2007.

Only one dam failure in Alaska has resulted in a fatality. Anchorage's Lake o' the Hills dam failed in 1972. The inundation map for this dam includes the grounds adjacent to O'Malley Elementary School.

12.2.1.3 Location, Extent, Impact, and Recurrence Probability

Location, extent, and recurrence probability

Due to security concerns this information is not available for these categories. However, *"An informal population risk estimate for State and Federal, Class I (high) hazard potential dams in Alaska is 4,000 people"* (Dams 2018).

Impacts

Future potential impacts from a dam failure event can be dramatic incident that results in a major catastrophe with substantial economic impacts and loss of life. There are varying degrees of failure that can contribute to uncontrolled water release from the reservoir, ranging from improper gated spillway operation to the partial or full breach of the dam's main structural components. Lesser degrees of failure often occur in advance of a catastrophic failure and are generally amenable to mitigation if detected and properly addressed. Dam failures can occur wherever the structures are located from several general causes, including:

- Inadequate spillway capacity which results in dam overtopping during extreme rainfall-runoff events
- Internal erosion or piping caused by seepage through the embankment or foundation or along conduits
- Improper or insufficient maintenance leading to decay and deterioration
- Inadequate design, improper construction materials, and poor workmanship
- Operation issues

- Failure of upstream dams on the same river system
- Landslides into a dam's reservoir creating a wave that overtops the dam
- Seismic instability

The Dam Safety Officer states that Alaska's informal population risk estimate for state and federal, Class I (high) hazard potential dams in Alaska is 4,000 people.

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12.2.2 Public Health

12.2.2.1 Hazard Characteristics

The Public Health section addresses infectious disease events and impacts that could potentially impact Alaska. Pandemic influenza is highlighted as an example.

Infectious diseases are disorders caused by bacteria, viruses, fungi, and parasites entering the human body and multiplying. Infections range from mild to deadly depending on the organism and the host. Organisms enter the body through: skin contact; inhalation; ingestion; blood (intravenous contact, bites, or punctures); sexual contact; and transmission from mothers to unborn children.

While infectious diseases pose a threat to people of any age and health condition, they are often a greater hazard to very young children, older adults, or people with compromised health. Vaccines and other advances in medical technology have reduced risks of some infectious diseases; however, new diseases emerge, new strains of existing diseases appear, and diseases that have been previously eliminated may re-emerge.

Viruses and bacteria are of particular concern in epidemics due to potential rapid mutation. Mutations can increase communicability, virulency, and resistance to medical treatment. A new strain of disease previously passed from animals to humans may mutate and become communicable between humans causing a rapid increase in the spread of infection. Due to the rapidly changing nature of infectious disease, public health officials carefully monitor and track communicable diseases and potential epidemic outbreaks. The challenge for infectious disease surveillance is to detect serious infections and the early stages of outbreaks in sufficient time to be able to prevent further spread.

Climate change is projected to adversely impact public health due to injuries and illnesses from severe weather events; increases in allergic, respiratory, vector-borne, and waterborne diseases; and threats to food and water supplies. While addressing these threats to public health is a challenge, developing adaptive public health capacities, integrating climate change impacts into current institutional learning, and improving resilience of local public health systems to climate change is essential to preventing injuries and illnesses, enhancing public health preparedness, and reducing risk.

12.2.2.2 History

The Alaska Department of Health and Human Services, Section of Epidemiology tracks annual disease outbreak trends. There have been no epidemics in recent history.

Table 7-4 2013 to 2017 Statewide Disease Event Summary

Causal agent	Number of Cases per Year				
	2013	2014	2015	2016	2017
Botulism	6	12	7	2	9
Campylobacteriosis (Campylobacter)	107	91	98	117	126
Chlamydial Infection (Chlamydia)	5792	5726	5653	5698	5935

Table 7-4 2013 to 2017 Statewide Disease Event Summary

Causal agent	Number of Cases per Year				
	2013	2014	2015	2016	2017
Giardiasis (Giardia)	82	89	94	86	90
Gonococcal Infection (Gonorrhea)	1135	1323	1115	1454	2190
Invasive Haemophilus Influenzae (H Influenzae)	21	23	22	18	23
Hepatitis C Virus (HCV)	1044	1260	1240	1193	1214
Human Immunodeficiency Virus (HIV)	59	76	64	76	75
Paralytic Shellfish Poisoning (PSP)	5	3	2	4	6
Pertussis	308	165	110	159	60
Rabies (Animal)	9	3	8	11	12
Salmonellosis (Salmonella)	83	83	83	83	83
Syphilis	68	68	68	68	68
Tuberculosis (TB)	78	78	78	78	78
Varicella	66	66	66	66	66

2016 Annual (January–December) Infectious Disease Report and 2017 Annual (January–December) Infectious Disease Report
Source: DHSS 2018

12.2.2.3 Location, Extent, Impact, and Recurrence Probability

Location

Characteristics of Alaska potentially impact the likelihood and impact of infectious disease events. Alaska has many remote communities which potentially makes effective implementation of control measures challenging. The state is also a temporary home to large numbers of guest workers who may have increased risk for certain infectious diseases. Disease transmission is often greatest in high density situations such as airports, nursing homes, dormitories, schools, and restaurants.

Extent

This section takes the example of an influenza epidemic or pandemic to illustrate the extent of a highly contagious disease. Planning for an influenza pandemic, whether "avian flu" or another especially virulent influenza variant, would be the same for any community in the nation. Determining which cross section of the population would be most affected and susceptible cannot be known in advance. A vaccine for a novel influenza virus would likely take many months to develop and distribute.

Impact

When a disease affects a greater portion of the population than would normally be expected, it is called either an outbreak (if limited in geography) or an epidemic. An epidemic that spreads across countries or continents is called a pandemic. Depending on the organism, outbreaks, epidemics, or pandemics may be considered public health emergencies, which require timely implementation of appropriate control measures. Such emergencies are commonly addressed through quarantine and immunization.

Recurrence Probability

Based on historical events, Alaska can expect that outbreaks of infectious diseases will occur each year, including food-borne viral and bacterial pathogens, pertussis, hepatitis, and influenza.

If another influenza pandemic occurs, Alaska is very likely to be affected. In the past century, there have been four influenza pandemics: 1918, 1957, 1968, and 2009. The 1918 influenza, a virus that killed an estimated 50 million people worldwide; killed at a higher rate in western Alaska than anywhere else in the United States. The 1918 disease devastated parts of Alaska. It caused one of the highest mortality rates in the world, entire Alaska village populations died during the pandemic.1

It is critical that pandemic recurrence be considered as part of Alaska's preparedness activities. Alaska has an active influenza surveillance program. During a pandemic, maintaining or strengthening existing surveillance activities and developing new surveillance strategies (e.g., expanding the number of existing sentinel surveillance sites, improving school absenteeism reporting, and the use of syndromic surveillance for rapid identification of infected persons) will be critical to launching an appropriate response. Surveillance strategies may need to change over the course of the pandemic and Department of Public Health staff should work with federal partners to identify and implement specific strategies. Epidemiologists at the state should use surveillance data to characterize the pandemic in the state which can help to inform response activities.

Implementation of Nonpharmaceutical interventions (NPIs) to decrease the spread of influenza may reduce the number of people infected early in the course of the outbreak, before vaccines are available for prevention. Nonpharmaceutical interventions include: personal, community, and environmental actions; examples of such interventions include social distancing, disseminating travel advisories, screening persons arriving from affected areas, closing schools, restricting public gatherings, using alternate care sites, and voluntary isolation and quarantine. The application of these interventions may be layered and will be guided by the evolving authorities.

In a pandemic, recommended NPIs may include recommendations that exceed everyday suggestions for minimizing influenza transmission; they could include social distancing strategies, voluntary quarantine, and a recommendation that ill individuals use a face mask in public. Use of these and other interventions in Alaska will be based upon the epidemiology of the pandemic and recommendations from federal and international authorities.

It is critical that pandemic recurrence be considered as part of Alaska's preparedness activities.

Note: [1] *1918 Influenza Pandemic: (https://www.smithsonianmag.com/history/journal-plague-year-180965222/)*

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