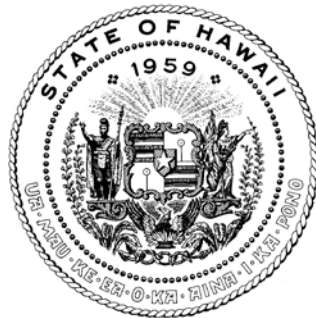


Report to the Twenty-Ninth Legislature
2018 Regular Session

**THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM
STATE FISCAL YEAR 2017**



Prepared by the
Department of Land and Natural Resources
State of Hawaii

In response to
Section 179D-29, Hawaii Revised Statutes

October 2017

THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM STATE FISCAL YEAR 2017

This report is prepared pursuant to Hawaii Revised Statutes (HRS) Section 179D-29, and covers the period from July 1, 2016 through June 30, 2017.

INTRODUCTION

The Department of Land and Natural Resources (Department), Engineering Division administers the Hawaii Dam and Reservoir Safety Act of 2007 (Act), codified as HRS Chapter 179D (Dam and Reservoir Safety Program). This Act, in conjunction with Hawaii Administrative Rules (HAR) Chapter 13-190.1, "Dams and Reservoirs", governs the design, construction, operation, maintenance, enlargement, alteration, repair, and removal of dams, reservoirs, and their appurtenant works in the State of Hawaii, to protect the health, safety, and welfare of the citizens of the State by reducing the risk of failure of the dams or reservoirs. Pursuant to HRS Section 179D-29, the Department shall submit an annual report to the governor and the legislature by January 5 of each year concerning the activities of the department relating to this chapter for the preceding fiscal year. The report shall include but not be limited to information on the following:

- (1) Approvals of plans and specifications for the construction of dams and reservoirs and for alterations, modifications, repairs, removal, and enlargements of any dams and reservoirs;
- (2) A listing of dam and reservoir safety inspections made;
- (3) Use of appropriated funds;
- (4) Rules adopted or amended;
- (5) Enforcement orders and proceedings;
- (6) Dam and reservoir failures and department evaluations of the reasons for the failure, if known; and
- (7) Any other available data regarding the effectiveness of the State's dam and reservoir safety program.

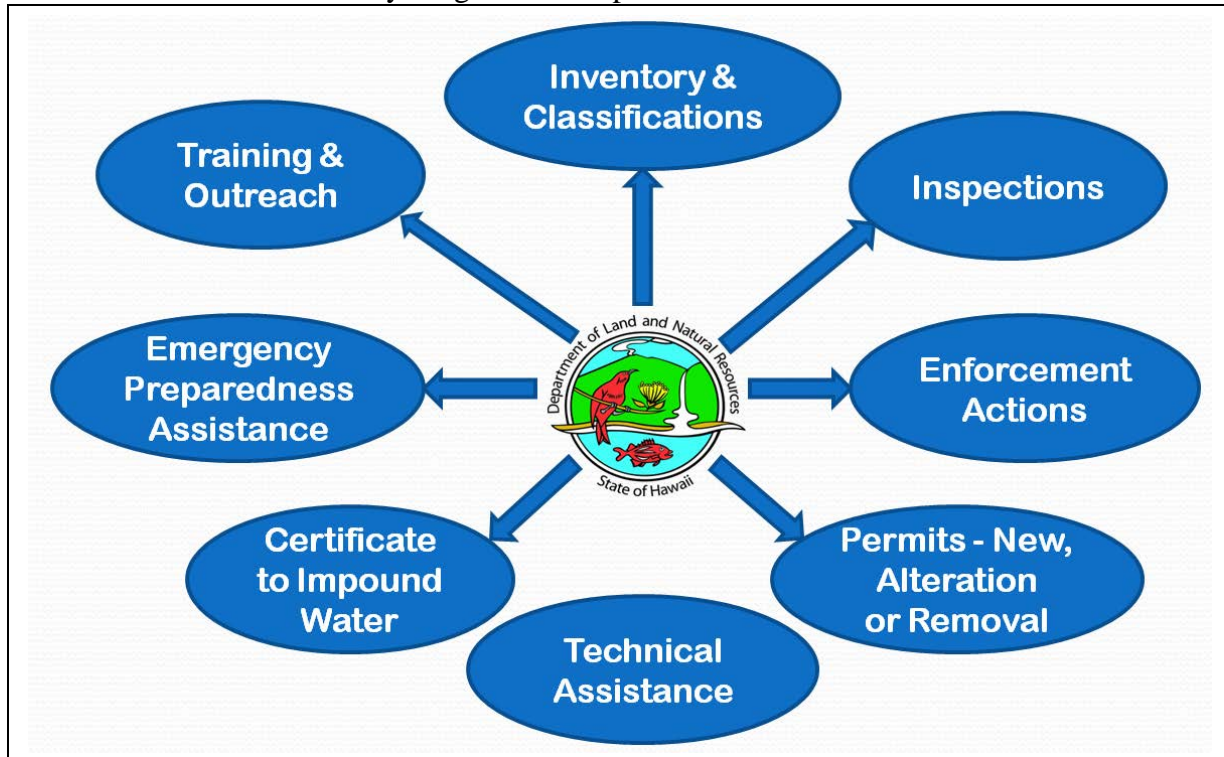
BACKGROUND

Historically, dams and reservoirs in Hawaii were predominately developed by the agriculture industry in the early 1900s. Today, dams and reservoirs continue to be used by the agriculture industry, in addition to providing storage for drinking water, flood control, hydro-electric, recreation and other purposes.

Only dams that meet a certain jurisdictional size criteria (height and volume) are regulated by the Department. Regulated dams are identified as having artificial barriers which are 25-feet or more in height or have an impounding capacity of 50-acre-feet (~17 million gallons) or more. Dams less than 6-feet in height, regardless of storage capacity, or that have a storage capacity less than 15-acre-feet (5 million gallons) regardless of height, do not fall under State of Hawaii jurisdiction, unless otherwise specified by the Dam and Reservoir Safety Program.

THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM

The Dam and Reservoir Safety Program is comprised of several core functions:



Regulated Dam Inventory and Dam Classifications: The Department maintains a database of regulated structures, including classifications of each in regard to size, hazard potential and overall condition. The Department verified and updated their inventory of regulated dams in 2006. Hazard potential classifications were updated and assigned by the department as a product of their statewide dam break modeling analysis conducted between 2007 and 2011. Subsequent updates to the hazard classifications have been made for newly added facilities or those with new data affecting this classification. The overall condition assessment classification is a relatively new field which the Dam and Reservoir Safety Program is working to consistently apply across the state based on the condition assessments conducted on all regulated dams. All regulated dams were assessed and assigned an overall condition assessment classification during phase I inspections conducted statewide in 2007-2009. These condition assessment classifications are being updated based on ongoing inspection findings.

Dam Safety Inspections: The Department staff routinely inspects regulated structures statewide and retains consultants as necessary, to confirm or provide additional assessments. The Department presently targets inspecting dams on a two-year frequency, although due to staff vacancies in 2016 & 2017 has had to stretch the duration out a little longer. The Department is currently in the process of finalizing contracts with several consultants to provide Phase I Inspections at various dams throughout the State. The Department plans to retain additional consultants in Fiscal Year (FY) 2018 until all regulated dams have an updated Phase I Inspection report. The Department also conducts construction or other informal inspections that are in addition to these visual dam safety inspections. Listings of the dams inspected this past fiscal year are attached at the end of this report.

Enforcement Actions: The Hawaii Dam and Reservoir Safety Act of 2007 authorized the Department to take enforcement action for both emergencies and any other violations of the Act. The Department has established administrative enforcement action procedures that are initiated by the following general deficiencies:

- Failure of dam and reservoir owners to comply with general requirements and responsibilities.
- Non-compliance with dam safety permit general terms and special conditions
- Non-compliance with certificate to impound terms and conditions

The Department did issue some penalty fines for delinquent submissions, however did not proceed with enforcement actions against any dam owner in FY 2017 (see Section D)

Dam Safety Construction Permits: A permit from the Board of Land and Natural Resources (Board) is required for all dam construction, alteration, enlargement, modifications or removal work. Dams are uniquely engineered structures that require knowledge and experience in dam safety, particularly how to safely handle water flows in and out of the structure through appurtenant features, as well as mitigating the hazards of water passing through the dam embankment itself (seepage). Dams sustain high hydrostatic water loads, which can result in failure of the embankment if they are not properly designed. Dam safety permits allow the Department to review and check proposed improvements for concurrence with current dam safety practices and guidelines. Work that is not considered routine maintenance requires prior approval from the Board. Detailed procedures and requirements for this permitting process are provided in HAR Chapter 190.1. The Department also has developed additional guidance documents for dam owners and designers as well as a standard set of general permit requirements.

Certificate of Approval to Impound: The Certificate of Approval to Impound (CAI) water requirement was included in the Hawaii Dam and Reservoir Safety Act of 2007. Issuance of this certificate will be dependent on dam and reservoir owners ensuring their structures are remedied of critical deficiencies and meet minimum operational criteria.

The Department has developed guidelines and procedures for this certificate in coordination with dam owners on the implementation of this new requirement. The Department sent out notices to complete and submit CAI applications, to all owners of regulated dams and reservoirs in the state in Fiscal Year 2014. The Department received CAI applications for most of the regulated structures and is in the process of reviewing these submissions.

Understanding that many of these dams are over 80 years old, and almost all were constructed before the development of any modern dam safety standards, the department is working with owners to establish a reasonable improvement schedule for these facilities to meet current regulations. In the interim period, the department is working with owners to mitigate these deficiencies through operational restrictions or other types of mitigative actions.

Emergency Preparedness: HRS Chapter 179D requires that all dam owners of High and Significant Hazard Potential dams complete and submit an Emergency Action Plan (EAP) to the Department. The Department developed guidelines and an EAP template for dam owners to utilize in formulating and executing a plan of action should a possible threat or deficiency occur on their dam facilities. The Department provides training and technical assistance to dam owners and emergency management officials to assist them in the completion and execution of the EAPs. Additionally, the Department is identified as a technical advisor during dam safety emergencies where an EAP is activated.

In April 2015, the Department coordinated EAP training and table top exercises on Oahu and Maui. Over 150 dam owners, operators, emergency managers, first responders and representative from supporting agencies participated in the event. The major objectives for this event was to provide training on basic technical understanding of typical dam failure modes and need of an EAP to mitigate these potential failures, run through several EAP test scenarios, and gain feedback from all participants on revising the current EAP template. Additional training exercises were conducted on Hawaii and Kauai in September 2015, with approximately 130 participants attending those exercises.

At present, the Department has an EAP for every regulated dam in the state. Recently the Department released a new online EAP tool, which simplifies the creation and routine updates of the EAP process. The tool allows the department to easily update the statewide template quickly and users can process revisions to EAPs almost instantly. Owners have responded with positive feedback regarding this new tool. In 2017, 37 EAPs have been processed and are available online via the EAP tool. Our goal is to have all owners migrate over to the new online tool and update their EAPs annually.

Training and Outreach: The Department provides technical assistance to the dam owners, operators and consultants, as well as to the broader community of hazard mitigation partners and agencies. The Department works closely with the Association of State Dam Safety Officials, (ASDSO) to collaborate on public outreach and national awareness of the importance of dam and reservoir safety programs. Recent training seminars included Operation and Maintenance Training and Emergency Action Planning Training.

In March and April of 2017, the Department sponsored three overview workshops on Oahu, Maui and Kauai, detailing the rehabilitation improvements for embankment dams and one technical training class. This overview workshop was focused on providing dam owners with insight on how to procure and scope professional services for investigations and rehabilitation work on their facilities. An additional two-day advanced technical training class was conducted to provide continuing education for the local dam safety technical community. Almost 200 people attended the various training events and over 20 different consulting firms and partner agencies were present.

The Department has also retained a consultant to train and assist the Department staff perform Probably Failure Mode Analysis on several dams to aid the Department better managing the risks of the current regulated dam portfolio.

FUNDING

The Dam and Reservoir Safety Program is funded under the Department’s LNR 810 Program, Prevention of Natural Disasters, and receives operational funding from two state special funds and one federal grant from the United States Department of Homeland Security, Federal Emergency Management Agency (FEMA). The following is a breakdown of available funds to the department for its dam safety activities in FY 2017:

Dam Safety Program Budget

State of Hawaii – Special Land and Development Fund (operating)	\$ 445,000
State of Hawaii – Dam and Reservoir Safety Special Fund	\$ 1,300,000
FEMA – National Dam Safety Program Grant (Federal FY 2015)	\$ 59,059
Total Available Funding	\$ 1,804,059

FY 2017 expenditures from the various funding sources were made as follows:

	Operating Special Fund	Dam and Reservoir Safety Special Fund	Federal Funds	Total
Personnel Services	\$ 377,860	\$ 0	\$ 0	\$ 377,860
Consultant Services*	\$ 0	\$ 642,640	\$ 0	\$ 642,640
Inspections Costs (including travel)	\$ 0	\$ 10,060	\$ 0	\$ 10,060
Training Expense (including travel)	\$ 0	\$ 139,000	\$ 48,467	\$ 187,467
Other Expenses (Supplies, Operating & Equipment)	\$ 41,700	\$ 63,770	\$ 10,592	\$ 116,062
B&F Management Fee	\$ 10,430	\$ 38,620	\$ 0	\$ 49,050
	\$ 429,990	\$ 894,090	\$ 59,059	\$ 1,383,139

* Includes \$ 428,140 of contract encumbrances for ongoing consultant contracts.

Funding for the LNR 810 Program supports multiple programs which include the State oversight of the National Flood Insurance Program, the State General Flood Control Plan and the Dam and Reservoir Safety Program

The Dam and Reservoir Safety Special Fund was intended to maintain a funding reserve should there be a dam safety emergency. The Hawaii Dam and Reservoir Safety Act of 2007 initially allocated \$2,000,000 to the Department’s Dam and Reservoir Safety Program, however only \$1,000,000 was released to the Department. With the new Hawaii Administrative Rules becoming effective at the end of FY 2012, the Department was able to start collecting Dam Safety Annual Fees from regulated dam owners. The collection of these fees has enabled the Department to meet the targeted \$ 700,000 minimum emergency reserve. The Department initiated several contracts this past year which included support for ongoing maintenance and enhancements to the Dam Inventory Management System, Dam Owner and Consultant Training,

Dam break modeling, and several contracts to continue installing remote water level gages and the software application to monitor these gages.

DAM SAFETY ACTIVITIES:

Approvals of plans and specifications for the construction of dam and reservoirs and for alterations, modifications, repairs, removals, and enlargements of any dams and reservoirs;

During FY 2017, three new dam safety alteration permit applications were received by the Department:

Permit No.	Dam ID	Dam Name	Status
78	HI-0004	Kitano Reservoir	Submitted / In-review
79	HI-0018	Opaepala Reservoir 1	Submitted / approval
80	HI-0105	Elima Reservoir	Submitted / In-review

The following is a listing of active permits in FY 2017 and their status:

Permit No.	Dam ID	Dam Name	Description of Improvements	Status / Comments
19	HI-0141	Kehalani Retention Basin	New Construction	Under Construction Permit revisions pending
20	HI-0098	Alexander Dam	Spillway Repairs/Veg	Constructed, pending approved close-out documents
38	HI-0094	Kapalaalea Reservoir	Sinkhole repair	Permit Revoked - 5 yr inactive
39	HI-0113	Omao Reservoir	Dam removal	Permit Approved, Pending Construction
42	HI-0013	Upper Kapahi Reservoir	Gate and Catwalk	Constructed, pending approved close-out documents

Permit No.	Dam ID	Dam Name	Description of Improvements	Status / Comments
43	HI-0060	Wailua Reservoir	Gate and Catwalk	Constructed, pending approved close-out documents
44	HI-0013	Upper Kapahi Reservoir	Dam Safety Improvements	Constructed, pending approved close-out documents
46	HI-0135	Hanamaulu Field 21	dam removal	Constructed, pending approved close-out documents
51	HI-0063	Aahoaka Reservoir	dam remediation	Permit Canceled - In Redesign
53	HI-0042	Waimea 60 MG Reservoir (Puukapu)	Dam improvement - lining, outlet slip-line, upstream control, subdrain	Approved, Pending Construction
54	HI-0131	Paauiilo Reservoir	Dam improvement - upstream control, vegetation	In construction
55	HI-0123	Puu Pulehu Reservoir	Dam improvement - buttress w/ subdrain, rehab DS slope, spillway imp	Permit Application under Review
59	HI-0040	Waikaloa Reservoir No. 1	Major repair.	Permit Application under Review
61	HI-0149	Maunaolu Reservoir	Drainage improvements	In construction
66	HI-0001	Nuuanu No. 4 Reservoir	Repair and improvement	Approved, Pending Construction
71	HI-0061	Lower Kapahi Reservoir	Removal	Permit Application under Review
73	HI-0064	Field 2 Kealia Reservoir	Removal	Approved, Pending Construction
74	HI-0065	Upper Anahola Reservoir	Reduction	Permit Application under Review
75	HI-0066	Lower Anahola Reservoir	Removal	Approved, Pending Construction
76	HI-0067	Field 1 Kealia Reservoir	Reduction	Permit Application under Review
77	HI-0140	Ukumehame Reservoirs	Removal	Permit Application under Review
78	HI-0004	Kitano Reservoir	Removal	Permit Application under Review
79	HI-0018	Opaeula Reservoir 1	Outlet Work Repair	Approved, Pending Construction
80	HI-0105	Elima Reservoir	Outlet Work Repair	Permit Application under Review

No permits were closed in FY 2017.

Additionally, the Department assisted many dam and reservoir owners in the review of preliminary designs, and proposed work. The following are a listing of those reservoirs that were engaged in this type of technical assistance.

Dam	Dam Name	Proposed Improvements
HI-0003	Puu Opae Reservoir	Proposed Pump storage rehabilitation
HI-0095	Haiku Reservoir	Proposed Outlet repair and seepage remediation
HI-0137	Oahu Reservoir 155	Dam Improvements – Lining and upgrades
HI-0049	Keaiwa Reservoir	Proposed embankment remediation and spillway repairs
HI-0020	Opaeula 15 Reservoir	Proposed removal

A. A listing of dam and reservoir safety inspections;

In FY 2017, The Dam and Reservoir Safety Program staff conducted 39 visual dam safety inspections on regulated dams. In addition to these inspections, the department also conducted 7 informal dam safety inspection visits (including post-earthquake and storm preparation inspections) and conducted 8 inspections to monitor construction activity. The inspection numbers for this fiscal year are very low and steps are being implemented to bring the program inspection number back on track to at least inspecting every dam on a two-year cycle. The Department has also started contracting with consultants to update the Phase I inspections on several dams statewide. A listing of the visual dam safety inspections are provided below:

State ID	Dam Name	Inspection Type	Date of Inspection
MA-0085	HC&S Reservoir 80	Visual Dam Safety	12-Jul-16
MA-0086	HC&S Reservoir 81	Visual Dam Safety	12-Jul-16
MA-0087	HC&S Reservoir 82	Visual Dam Safety	12-Jul-16
KA-0061	Lower Kapahi Reservoir	Visual Dam Safety	3-Aug-16
KA-0112	Aepoaha	Visual Dam Safety	25-Aug-16
KA-0104	Huinawai Reservoir	Visual Dam Safety	10-Nov-16
KA-0103	Aepo Reservoir	Visual Dam Safety	10-Nov-16
KA-0110	Aepoalua Reservoir	Visual Dam Safety	10-Nov-16
KA-0111	Aepoekolu Reservoir	Visual Dam Safety	10-Nov-16
KA-0106	Kumano Reservoir	Visual Dam Safety	17-Nov-16
KA-0108	Kaupale Reservoir	Visual Dam Safety	17-Nov-16
KA-0114	Piwai Reservoir	Visual Dam Safety	17-Nov-16
KA-0113	Omao Reservoir	Visual Dam Safety	17-Nov-16
MA-0127	Napili 4-5 Desilting Basin	Visual Dam Safety	17-Nov-16
MA-0126	Kahana Nui Dam	Visual Dam Safety	17-Nov-16
MA-0128	Napili 2-3 Desilting Basin	Visual Dam Safety	17-Nov-16

State ID	Dam Name	Inspection Type	Date of Inspection
MA-0130	Honokowai Structure #8	Visual Dam Safety	17-Nov-16
MA-0134	Kaopala Basin	Visual Dam Safety	17-Nov-16
MA-0056	Hanakaoo	Visual Dam Safety	23-Nov-16
MA-0054	Horner	Visual Dam Safety	23-Nov-16
MA-0046	Waikamoi Dam No. 2	Visual Dam Safety	8-Feb-17
MA-0152	Waikamoi Reservoirs	Visual Dam Safety	8-Feb-17
MA-0138	Kahakapao Reservoirs	Visual Dam Safety	8-Feb-17
MA-0048	Olinda Reservoir	Visual Dam Safety	8-Feb-17
MA-0047	Piiholo 50 MG Reservoir	Visual Dam Safety	15-Feb-17
MA-0144	Mahinahina Reservoir	Visual Dam Safety	15-Feb-17
KA-0101	Hukiwai Reservoir	Visual Dam Safety	9-Mar-17
KA-0102	Ioleau Reservoir	Visual Dam Safety	9-Mar-17
HA-0147	Punawai Reservoir	Visual Dam Safety	23-Mar-17
HA-0043	Puukapu Watershed Retarding Dam	Visual Dam Safety	22-Jun-17
KA-0119	Mauka Reservoir	Visual Dam Safety	23-May-17
KA-0107	Puu O Hewa Reservoir	Visual Dam Safety	23-May-17
KA-0115	Pia Mill Reservoir	Visual Dam Safety	23-May-17
KA-0063	Aahoaka Reservoir	Visual Dam Safety	31-May-17
KA-0024	Kalihiwai Reservoir	Visual Dam Safety	28-Jun-17
KA-0146	Halaula Reservoir	Visual Dam Safety	28-Jun-17
HA-0051	Hawi 5 Reservoir	Visual Dam Safety	22-Jun-17
OA-0154	Nuuanu Reservoir No. 1	Visual Dam Safety	2-Aug-17
OA-0149	Maunaolu Reservoir	Visual Dam Safety	3-Aug-17

Other Inspections Conducted Statewide:

State ID	Dam Name	Inspection Type	Date of Inspection
OA-0149	Maunaolu Reservoir	Construction	1-Jul-16
OA-0149	Maunaolu Reservoir	Construction	22-Jul-16
KA-0013	Upper Kapahi Reservoir	Construction	3-Aug-16
OA-0149	Maunaolu Reservoir	Construction	4-Aug-16
OA-0149	Maunaolu Reservoir	Construction	23-Aug-16
OA-0149	Maunaolu Reservoir	Construction	23-Aug-16
OA-0149	Maunaolu Reservoir	Construction	7-Sep-16
KA-0112	Aepoeha Reservoir	Construction	23-May-17
OA-0154	Nuuanu Reservoir No. 1	Informal	25-Jul-16
OA-0017	Wahiawa Reservoir	Informal	1-Sep-16
OA-0129	Waimanalo 60 MG Reservoir	Informal	8-March-17
OA-0129	Waimanalo 60 MG Reservoir	Informal	3-May-17
KA-0014	Okinawa Reservoir	Informal	31-May-17
KA-0121	Halenanahu Reservoir	Informal	31-May-17
KA-0120	Papuaa Reservoir	Informal	31-May-17

B. Rules adopted or amended;

No dam safety rules were adopted or amended. Act 134, Session Laws of Hawaii 2017 clarified that aboveground freshwater storage tanks are included in the definition of "appurtenant works" for authorizing the issuance of special purpose revenue bonds to assist dam and reservoir owners.

The 2016 Legislature authorized the availability of varying amounts of special purpose revenue bonds (SPRB) to four dam owners/operators to fund improvements and modifications to their facilities. The approval of the SPRB issuance will require further discussion between the dam owner/operator and the Department of Budget and Finance, and satisfactory credit underwriting review of the financing components with respect to the proposed financing. The facilities for which SPRBs are approved by the legislature and pending Budget and Finance review are:

KA-030	Kaloko Dam
MA-141	Kehalani Offsite Retention Basin
MA-140	Ukumehame Reservoirs
MA-150	Wailuku Reservoir No.6

The Department notes that there were several bills introduced in the 2017 Legislative Session to allow additional reservoirs to be eligible for SPRB, however none of these measures were passed out of the Legislature.

C. Enforcement orders and proceedings;

The Department did issue one penalty fine via enforcement action for delinquent submissions to the dam owner of the following dams in FY 2017:

KA-62	Twin Reservoirs (Delinquent Annual Fee) for \$ 450.00
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D. Dam and reservoir failures and department evaluations of the reasons for the failure, if known;

There were no known dam failures or incidents in FY 2017.

E. Other available data regarding the effectiveness of the State's Dam and Reservoir Safety Program.

The Dam and Reservoir Safety Program worked with dam owners to complete Emergency Action Plans (EAP) for their facilities. EAPs are required by statute for only high and significant hazard potential classifications of dams. Out of the 132 regulated dams in FY 2017, 127 are classified as high or significant hazard potential structures. All regulated dams have EAPs on file with the Department, 30 of them via the new online EAP Tool. The following is a summary of EAPs on file with the Department for all classifications.

Number of Dams with EAPs							
FY 2004	FY 2007	FY 2010	FY 2012	FY 2013	FY 2014	FY 2015	FY 2017
12	55	121	125	130	127	130	132 of 132