

DAVID Y. IGE  
GOVERNOR OF  
HAWAII



**DEPT. COMM. NO. 5**

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COMMISSION ON WATER RESOURCE MANAGEMENT

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KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS

**STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

December 2, 2020

The Honorable Ronald D. Kouchi,  
President  
and Members of the Senate  
Thirty-First State Legislature  
State Capitol, Room 409  
Honolulu, Hawaii 96813

The Honorable Scott K. Saiki, Speaker  
and Members of the House of  
Representatives  
Thirty-First State Legislature  
State Capitol, Room 431  
Honolulu, Hawaii 96813

Dear President Kouchi, Speaker Saiki, and Members of the Legislature:

For your information and consideration, I am transmitting a copy of The Hawaii Dam and Reservoir Safety Program State Fiscal Year 2020 report, as required by Section 179D-29, Hawaii Revised Statutes (HRS). In accordance with Section 93-16, HRS, a copy of this report has been transmitted to the Legislative Reference Bureau and the report may be viewed electronically at <https://files.hawaii.gov/dlnr/reports-to-the-legislature/2021/EN21-Dam-Safety-Report-FY20.pdf>.

Sincerely,

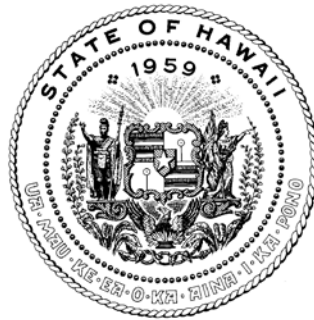
A handwritten signature in black ink that reads "Suzanne D. Case".

SUZANNE D. CASE  
Chairperson

Enclosure

Report to the Thirty-First Legislature  
2021 Regular Session

**THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM  
STATE FISCAL YEAR 2020**



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

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

December 2020

## **THE HAWAII DAM AND RESERVOIR SAFETY PROGRAM STATE FISCAL YEAR 2020**

This report is prepared pursuant to Hawaii Revised Statutes (HRS) Section 179D-29 and covers the period from July 1, 2019 through June 30, 2020.

### **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.

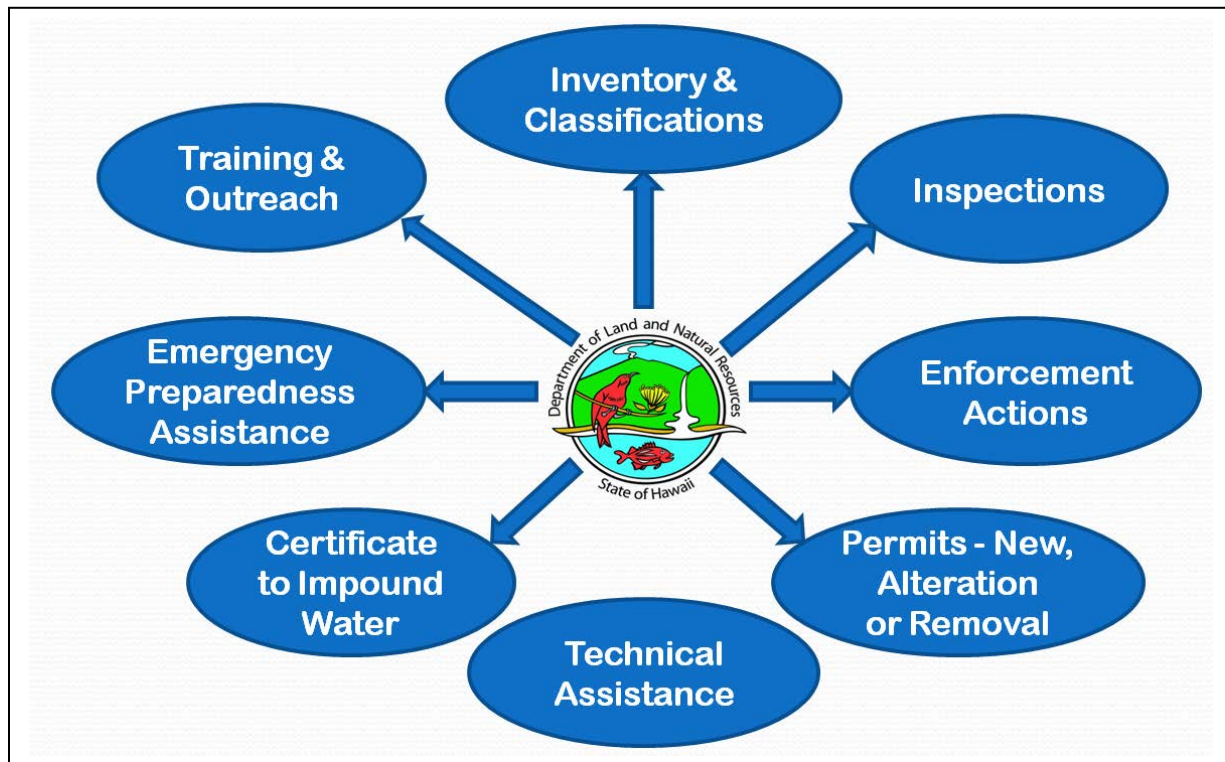
### **BACKGROUND**

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 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 recently completed Phase I investigations.

**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, 2018 and 2020 it has had to stretch the duration out longer. One vacancy was able to be filled, however two out of the three engineers in the dam safety unit are vacant. The Department processed several contracts with consultants to provide Phase I Inspections at various dams throughout the State in Fiscal Year (FY) 2019 & 2020. The Department plans to retain additional consultants until most of the regulated high hazard dams have an updated Phase

I investigation completed, dependent on available funding. The Department also conducts construction or other informal inspections that are in addition to these visual dam safety inspections.

In FY 2019, the Department completed Potential Failure Mode Analysis for four (4) dams on the island of Kauai. The potential failure mode analysis process is an effective way to review, evaluate and rate the probability of various failure mechanisms on a dam in relation to the dam's current operations and provides a uniform way to rank this dam in relation to others in the inventory. These types of analysis allow a more real-world view of the deficiencies and failure possibilities at each facility and highlights the highest risk dangers for the owners and regulators to focus on. Once an owner or agency is able to complete these types of analysis for their portfolio of dams, they can objectively prioritize them by risk and urgency for remedial actions. The Department conducted four (4) Potential Failure Mode Analysis Workshops in FY 2020 on Oahu for dams located on Oahu and Maui. The workshops were opened to several dam owners who have multiple dams in their portfolio to educate them on the process and utilize their knowledge to aid in analyzing the facilities.

The second half of FY 2020 brought significant challenges and disruption to the dam safety inspection program. Travel restrictions and uncertainties relating to the Coronavirus resulted in staff working remotely from home and postponement of inter-island inspections. The Department shifted from physical inspections to the creation of a remote inspection program. Dam safety staff reviewed previous inspections and created a detailed facility map with points of interest and instructions for owners to conduct inspections and transmit photos of these specific locations. Remote inspections are not the preferred method; however, they do require owners take a more active role and provide the Department visual observation of the structures while maintaining social distancing and safety precautions.

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 various actions such as the following:

- Failure to timely address unsafe or emergency conditions
- Conducting construction work on a dam without a permit
- Non-compliance with dam safety permit general terms and special conditions
- Failure to furnish requested information or submit required documents or reports
- Failure to submit a required emergency action plan (EAP) or EAP update
- Failure to pay the annual dam owner fee
- Failure to complete corrective actions as ordered by the Board or its agent

Enforcement actions pursued by the Department in Fiscal Year 2020 is described in Section D of this report.

**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 and constructed. 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 when an EAP is activated.

The Department worked with dam owners to have an EAP on file for every regulated dam in the state, with the exception of a new dam structure that was added to the state dam inventory of regulated dams in FY 2020. The Department notified the owner of this requirement and the owner has retained a consultant to develop an EAP.

The Department has an 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 FY 2020 the Department worked with dam owners to have all their EAPs utilize this new online tool and be current within 12 months. All owners have complied with this request, except for one dam that was recently added to the inventory.

**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. Past Dam Safety training events include:

2008 Dam Safety Failure Mechanisms and Inspections - Statewide  
 2012 Dam Safety Operation and Maintenance Training – Statewide  
 2014 Dam Safety Inspections – Statewide  
 2015 Dam Safety Emergency Actions Workshops – Statewide  
 2017 Dam Evaluation and Rehabilitation Workshops – Statewide  
 2017 Dam Safety Rehabilitation Technical Seminar – Oahu  
 2019 Dam Safety Emergency Intervention Workshops – Kauai, Maui, & Oahu  
 2020 Dam Failure Modes Analysis Workshop – Oahu

The Department maintains an online inventory of dams for regulated dams in the state and makes this inventory available to the public at [dams.hawaii.gov](https://dams.hawaii.gov). The Department coordinates with the Counties to provide current Dam Evacuation Maps on the Department’s dam safety inventory website for the public to download. Residents are also able to quickly identify if their parcels are in a dam evacuation area by entering their address into the Department’s Flood Hazard Assessment Tool ([HawaiiNFIP.org](https://hawaii.nfip.org)) and click on the detailed flood report.

## 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 2020:

### Dam Safety Program Budget

State of Hawaii – Special Land and Development Fund (operating)	\$ 445,000
State of Hawaii – Dam and Reservoir Safety Special Fund – Previous Year Transfer	\$ 903,330
Revenues (Annual Fees, Permit Fees, Enforcements)	\$ 633,070
FEMA – National Dam Safety Program Grant (Federal FY 2020)	\$ 54,680
Total	\$ 2,036,080
Emergency Contingency Reserve	\$ <700,000>
Total Available Funding	\$ 1,336,080

FY 2020 expenditures from the various funding sources were made as follows:

	Operating Special Fund	Dam and Reservoir Safety Special Fund	Federal Funds	Total
Personnel Services	\$ 409,460	\$ 0	\$ 0	\$ 409,460
Consultant Services*	\$ 0	\$ 1,137,370	\$ 0	\$ 1,137,370
Inspections Costs (including travel)	\$ 0	\$ 5,690	\$ 0	\$ 5,690
Training Expense (including travel)	\$ 7,090	\$ 27,030	\$5,640	\$ 39,760
Other Expenses (Supplies, Operating & Equipment)	\$ 7,210	\$ 1,820	\$ 27,570	\$ 36,600
B&F Management Fee	\$ 43,180	\$ 50	\$ 0	\$ 43,230
	\$ 466,940	\$ 1,171,960	\$ 33,210	\$ 1,672,110

\* Includes \$500,000 for consultant contracts for Probable Maximum Precipitation updates

Operating funding for the State LNR 810 Program supports multiple sub-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. Some assumptions were taken to separate costs between these programs for this report. The Dam and Reservoir Safety Special Fund was intended to maintain a funding source for ongoing operations as well as a dam safety emergency reserve. HAR Chapter 190.1 enables the Department to collect Dam Safety Annual Fees from regulated dam owners. The Department dipped into the targeted \$ 700,000 emergency contingency reserve, due to inspection and other consulting contracts.

#### **DAM SAFETY ACTIVITIES:**

- A. 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;

The following is a listing of active permits in FY 2020 and their status:

Permit No.	State ID	Dam Name	Description of Improvements	Status / Comments
19	MA-0141	Kehalani Retention Basin	New Construction	Under Construction Permit revisions pending
39	KA-0113	Omao Reservoir	Dam removal	Permit Approved, Pending Construction
51	KA-0063	Aahoaka Reservoir	Improvement	Approved / Resubmission for project scope change
53	HA-0042	Waimea 60 MG Reservoir (Puukapu)	Dam improvement - lining, outlet slip-line, upstream control, subdrain	In construction; On hold pending design revision



Permit No.	State ID	Dam Name	Description of Improvements	Status / Comments
54	HA-0131	Paauilo Reservoir	Dam improvement - upstream control, vegetation	In construction; On hold pending design revision
55	HA-0123	Puu Pulehu Reservoir	Dam Spillway/Embankment Rehabilitation	Permit Application under Review. Owner redesigning
59	HA-0040	Waikaloa Reservoir No. 1	Major repair.	In construction; On hold pending design revision
66	OA-0001	Nuuanu No. 4 Reservoir	Repair and improvement	In Construction
68	OA-0137	Oahu Reservoir 155	Improvement	Permit Application under Review
71	KA-0061	Lower Kapahi Reservoir	Removal	Permit Application under Review
73	KA-0064	Field 2 Kealia Reservoir	Removal	Approved, In -Construction
74	KA-0065	Upper Anahola Reservoir	Rehabilitation	On hold – Owner redesigning
75	KA-0066	Lower Anahola Reservoir	Removal	Approved, In-Construction
76	KA-0067	Field 1 Kealia Reservoir	Rehabilitation	On hold – Owner redesigning
77	MA-0140	Ukumehame Reservoirs	Removal	Approved; Pending Design Scope Revision
78	KA-0004	Kitano Reservoir	Removal	Construction completed, Pending closing documents
80	KA-0105	Elima Reservoir	Outlet Work Repair	In Construction
81	KA-0024	Kalihiwai Reservoir	Spillway & Emb. Rehab.	Owner Revising Plan
-	MA-0058	Honokowai Dam	Proposed Reduction	Preliminary Review
-	KA-0114	Piwai - Dam Reduction	Proposed Removal	Preliminary Review
-	KA-0030	Kaloko - Remediation	Rehabilitation / Reduction	Preliminary Review
-	OA-0129	Waimanalo 60 MG - Crest Modifications	Crest Modification	Preliminary Review
-	OA-0025	Ku Tree Removal	Removal	Preliminary Review
-	MA-0094	Kapalaalaea Reservoir-Breach	Removal	Preliminary Review
-	OA-0017	Wahiawa Reservoir	Spillway Improvement	Preliminary Review
-	MA-0073	HC&S Reservoir 24 - Removal	Removal / Reduction	Preliminary Review
-	MA-0093	Kaupakalua Reservoir Removal	Removal	Preliminary Review
-	MA-0095	Haiku Reservoir Remediation	Remediation	Preliminary Review
-	HA-0049	Keaiwa Reservoir	Removal / Reduction	Preliminary Review

Two permits were closed in FY 2020:

Permit No.	State ID	Dam Name	Description of Improvements	Status / Comments
61	OA-0149	Maunaolu Reservoir	Drainage improvements	Completed
72	OA-0020	Opaeula Reservoir 15	Removal	Completed

B. Listing of dam and reservoir safety inspections;

In FY 2020, Dam and Reservoir Safety Program staff conducted 21 visual and Phase I dam safety inspections on regulated dams. In addition to these inspections, the Department also conducted one informal dam safety visit and several inspections to monitor construction activity. The inspection numbers for this fiscal year are very low and due to the Covid-19 pandemic the Department initiated a new remote inspection with dam owners. 21 remote dam inspections requests were initiated in 2020, of which 4 have been received back from the owners and reports being drafted. The Department has continued contracting with consultants to update the Phase I inspections on selected dams statewide. A listing of dam safety inspections is provided below:

State ID	Dam Name	Inspection Type	Date of Inspection
OA-0017	Wahiawa	site visit	14-Jan-20
MA-0094	Kapalaalaea Reservoir	Visual Dam Safety	5-Feb-20
MA-0092	Papaaea Reservoir	Visual Dam Safety	5-Feb-20
MA-0072	Maui Reservoir 22	Visual Dam Safety	12-Feb-20
MA-0074	Maui Reservoir 25	Visual Dam Safety	12-Feb-20
MA-0076	Maui Reservoir 33	Visual Dam Safety	12-Feb-20
MA-0079	Maui Reservoir 52	Visual Dam Safety	12-Feb-20
MA-0143	Kailiili Reservoir	Visual Dam Safety	13-Feb-20
MA-0139	Maui Field 290 Reservoir	Visual Dam Safety	13-Feb-20
KA-0105	Elima	Visual Dam Safety	19-Feb-20
KA-0116	Mau	Visual Dam Safety	19-Feb-20
KA-0117	Elua	Visual Dam Safety	19-Feb-20
OA-0124	Kaneohe	Phase I (AECOM)	25-Feb-20
OA-0129	Waimanalo	Phase I (AECOM)	25-Feb-20
OA-0001	Nuuanu 4	Phase I (AECOM)	26-Feb-20

<b>State ID</b>	<b>Dam Name</b>	<b>Inspection Type</b>	<b>Date of Inspection</b>
MA-0153	Plantation Reservoir	Remote Dam Safety	11-May-20
MA-0141	Kehalani Offsite Ret Basin	Remote Dam Safety	13-May-20
MA-0142	Middle Field 14	Remote Dam Safety	13-May-20
MA-0132	Upper Field 14	Remote Dam Safety	14-May-20
OA-0023	Helemano 6	Phase I (AECOM)	26-Feb-20
OA-0137	Oahu 155	Phase I (AECOM)	27-Feb-20
OA-0149	Maunaolu	Phase I (AECOM)	27-Feb-20
MA-0085	Maui Reservoir 80	Visual Dam Safety	11-Mar-20
MA-0086	Maui Reservoir 81	Visual Dam Safety	11-Mar-20
MA-0087	Maui Reservoir 82	Visual Dam Safety	11-Mar-20
MA-0089	Maui Reservoir 90	Visual Dam Safety	11-Mar-20

C. Rules adopted or amended;

No Dam Safety rules were adopted or amended in FY 2020.

D. Enforcement orders and proceedings;

For FY 2020 the Department issued enforcement action for EAP updates and FY 2020 Annual Dam Fee violations.

EAP update violations:

<b>State ID</b>	<b>Dam Name</b>	<b>Penalty</b>
KA-0030	Kaloko Reservoir	\$250
KA-0062	Twin Reservoir	\$250
KA-0064	Kealia 2	\$250
KA-0065	Upper Anahola	\$250
KA-0066	Lower Anahola	\$250

FY 2020 Annual Dam Fee violations:

<b>State ID</b>	<b>Dam Name</b>	<b>Penalty</b>
KA-0010	Waiakalua Reservoir	\$422.98

The Department also issued out 9 Notice of Deficiencies in FY 2020 for owners with reservoir identified as being in Poor or Unsatisfactory Physical Condition and restricted the level of the water in the dam/reservoir and required a remediation schedule. A listing of these dams:

State ID	Dam Name
OA-0017	Wahiawa Reservoir
OA-0025	Ku Tree Reservoir
HA-0049	Keaiwa Reservoir
MA-0073	Maui Reservoir 24
MA-0093	Kaupakalua Reservoir
MA-0094	Kapalaalaea Reservoir
MA-0095	Haiku Reservoir
MA-0140	Ukumehame Reservoir
OA -0156	Koolau Reservoir

The Department also maintained the following dam restrictions issued in previous years.

State ID	Dam Name	Deficiency	DLNR Restriction
HA-0049	KEAIWA RESERVOIR	Earthquake Damage	Keep Empty
HA-0051	HAWI NO. 5 RESERVOIR	Outlet Not Functioning Properly	Keep Empty
KA-0002	PUU LUA RESERVOIR	No Spillway	Keep Below 59 ft. (Top of Dam = 111 ft.)
KA-0003	PUU OPAE RESERVOIR	Abandoned Condition	Keep Empty
KA-0005	MANA RESERVOIR	No Spillway	Keep Empty
KA-0010	WAIKALUA RESERVOIR	Requires Hydraulic and Stability Studies	Keep below 9 ft (Top = 19 ft)
KA-0014	OKINAWA RESERVOIR	Requires Hydraulic and Stability Studies	Keep 10-ft Below Top of Dam
KA-0015	KANEHA RESERVOIR	Spillway Undersized	Keep Below 22' (Spillway = 42')
KA-0016	MIMINO RESERVOIR	Spillway Undersized	Keep Below 26' (Spillway = 36')
KA-0024	KALIHUWAI RESERVOIR	Requires Hydraulic and Stability Studies	Keep Below 10.2' (Top = 18.6')

State ID	Dam Name	Deficiency	DLNR Restriction
KA-0030	KALOKO RESERVOIR	Partially Breached - No Permanent Repair	Keep Below 21.0' (Spillway = 22.7') (Top >40')
KA-0061	LOWER KAPAHI RESERVOIR	No Spillway	Keep Empty
KA-0062	TWIN RESERVOIRS	Spillway Undersized / Abandoned Condition	Keep Empty
KA-0063	AAHOAKA RESERVOIR	No Functioning Outlet / Spillway Undersized	Keep at Outlet Elevation (426.8)
KA-0064	FIELD 2 KEALIA RESERVOIR	Abandoned Condition	Keep Empty
KA-0065	UPPER ANAHOLA RESERVOIR	Abandoned Condition	Keep Empty
KA-0066	LOWER ANAHOLA RESERVOIR	Abandoned Condition	Keep Empty
KA-0067	FIELD 1 KEALIA RESERVOIR	Abandoned Condition	Keep Empty
KA-0100	KAPA RESERVOIR	Requires Hydraulic and Stability Studies	Keep Below 6' (Spillway = 11')
KA-0101	HUKIWAI RESERVOIR	No Spillway	Keep Below 12' (Top =17')
KA-0102	IOLEAU RESERVOIR	Spillway Undersized	Keep Below 25'
KA-0105	ELIMA RESERVOIR	Spillway Undersized	Keep Below 7' (Spillway = 22')
KA-0106	KUMANO RESERVOIR	No Spillway	Keep Empty
KA-0107	PUU O HEWA RESERVOIR	Requires Hydraulic and Stability Studies	Keep Below Lower Spillway Elevation
KA-0108	KAUPALE RESERVOIR	Spillway Undersized	Keep Empty
KA-0109	IPUOLONO RESERVOIR	Spillway Undersized	Keep Below 25' (Spillway = 45')
KA-0111	AEPOEKOLU RESERVOIR	Spillway Undersized	Keep Empty
KA-0112	AEPOEHA RESERVOIR	Spillway Undersized	Keep Below 27' (Spillway = 37')
KA-0113	OMAO RESERVOIR	Spillway Undersized	Keep Empty
KA-0114	PIWAI RESERVOIR	Spillway Undersized	Keep Empty
KA-0115	PIA MILL RESERVOIR	Requires Hydraulic and Stability Studies	Keep 5ft. Below Spillway
KA-0116	MAU RESERVOIR	Spillway Undersized	Keep Empty
KA-0117	ELUA RESERVOIR	Spillway Undersized	Keep Below 16' (Spillway = 26.6')

<b>State ID</b>	<b>Dam Name</b>	<b>Deficiency</b>	<b>DLNR Restriction</b>
KA-0118	MANUHONUHONU RESERVOIR	No Spillway	Keep Empty
KA-0119	MAUKA RESERVOIR	Requires Hydraulic and Stability Studies	Keep 5 ft. Below Spillway
KA-0121	HALENANAHU RESERVOIR	Requires Hydraulic and Stability Studies	Keep 20 ft. Below Spillway
KA-0146	HALAULA RESERVOIR	Requires Hydraulic and Stability Studies	Keep Below Spillway
MA-0054	HORNER RESERVOIR	Requires Hydraulic and Stability Studies	Keep Below 300" Gage (Spillway = 360" Gage)
MA-0068	MAUI RESERVOIR 14	Reservoir Overtops from Design	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0070	MAUI RESERVOIR 20	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0073	HC&S RESERVOIR 24	Reservoir Overtops from Design Rainstorm event	Keep and maintain empty under normal conditions, alert / coordinate downstream population notification with Maui EMA.
MA-0074	MAUI RESERVOIR 25	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0076	MAUI RESERVOIR 33	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0078	MAUI RESERVOIR 42	Poor condition, requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0079	MAUI RESERVOIR 52	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0080	MAUI RESERVOIR 60	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0081	MAUI RESERVOIR 61	Reservoir does not have required safety freeboard	Maintain water level at least 5' below spillway elevation
MA-0082	MAUI RESERVOIR 70	Repairs needed, requires H&H, topo & stability study	Maintain water level at least 5' below spillway elevation
MA-0083	MAUI RESERVOIR 73	Repairs needed, requires H&H and stability study	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0084	MAUI RESERVOIR 74	Reservoir Overtops from Design Rainstorm event	Maintain Empty
MA-0085	MAUI RESERVOIR 80	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0086	MAUI RESERVOIR 81	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation

State ID	Dam Name	Deficiency	DLNR Restriction
MA-0087	MAUI RESERVOIR 82	Poor Condition, require Freeboard Buffer	Maintain water level at least 5' below spillway elevation
MA-0088	MAUI RESERVOIR 84	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0089	MAUI RESERVOIR 90	Requires H&H and stability study	Maintain water level at least 5' below spillway elevation
MA-0090	MAUI RESERVOIR 92	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0091	PEAHI RESERVOIR	Reservoir Overtops from Design Rainstorm event	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0092	PAPAAEA RESERVOIR	Repairs needed, requires H&H, topo & stability study	Maintain Empty, unless water required, coordinate safe level with DLNR
MA-0093	KAUPAKALUA RESERVOIR	Reservoir Overtops from Design Rainstorm event and seepage at toe	Keep and maintain empty under normal conditions, alert / coordinate downstream population notification with Maui EMA.
MA-0094	KAPALAALAEA RESERVOIR	Reservoir Overtops from Design Rainstorm event and has piping along outlet	Maintain Empty
MA-0095	HAIKU RESERVOIR	Reservoir Overtops from Design Rainstorm event and has piping along outlet	Drain and maintain empty, alert Maui EMA of potential hazard
MA-0096	PAUWELA RESERVOIR	Reservoir Overtops from Design Rainstorm event	Drain and maintain water at outlet works elevation, alert / coordinate downstream population notification with Maui EMA.
MA-0140	UKUMEHAME RESERVOIRS	Spillway Undersized	Res 2: Keep Below 2' Res 3: Keep Below 10'
MA-0151	WAILUKU WATER RESERVOIR 10	Requires Hydraulic and Stability Studies	Keep Below 9' (Spillway = 11.6')
OA-0017	WAHIAWA DAM	Spillway Undersized	Keep Below 65' (Spillway = 80')
OA-0023	HELEMANO 6 RESERVOIR	Spillway Erosion	Keep 15' Below Top of Dam
OA-0025	KU TREE RESERVOIR	Abandoned Condition	Keep Empty
OA-0154	NUUANU RESERVOIR NO. 1	No Functioning Outlet / Spillway Undersized	Keep Below 381.5

- E. Dam and reservoir failures and department evaluations of the reasons for the failure, if known;

There were no known dam failures or incidents reported in FY 2020.

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

The Dam and Reservoir Safety Program has been working with dam owners in the preparation of their Emergency Action Plans (EAP) for their facilities. EAPs are required by Statute for all high and significant hazard potential classifications of dams. Out of the 131 regulated dams in FY 2020, 126 are classified as high or significant hazard potential structures. All regulated dams except one have EAPs on file with the Department, and all EAPs have been migrated and updated on the Department's new online "Easy EAP" Tool. The following is a summary of EAPs on file with the Department for all classifications.

FY 2004	FY 2007	FY 2010	FY 2015	FY 2018	FY 2019	FY 2020
12	55	121	130	132	131 of 131	130 of 131