

Kekaha Agriculture Association Overview of Ditch Systems and Agricultural Infrastructure

Commission on Water Resource Management

Lihue, Kauai

April 29, 2015



**KEKAHA AGRICULTURE
ASSOCIATION**

A NON-PROFIT AGRICULTURAL COOPERATIVE
Est. 2003

Agricultural Infrastructure – Key Points



History and Role of KAA

- * Kekaha Sugar Company ceased operations in 2001
- * Kekaha Agriculture Association formed in 2003
 - * HRS ch. 421 agricultural cooperative
 - * Purpose is to “promote effective and compatible agriculture/aquaculture business uses” of the ADC lands
- * ADC/KAA to manage, operate, maintain and repair agriculture infrastructure (irrigation, drainage, electricity, roads) under E.O. 4007 and E.O. 4287

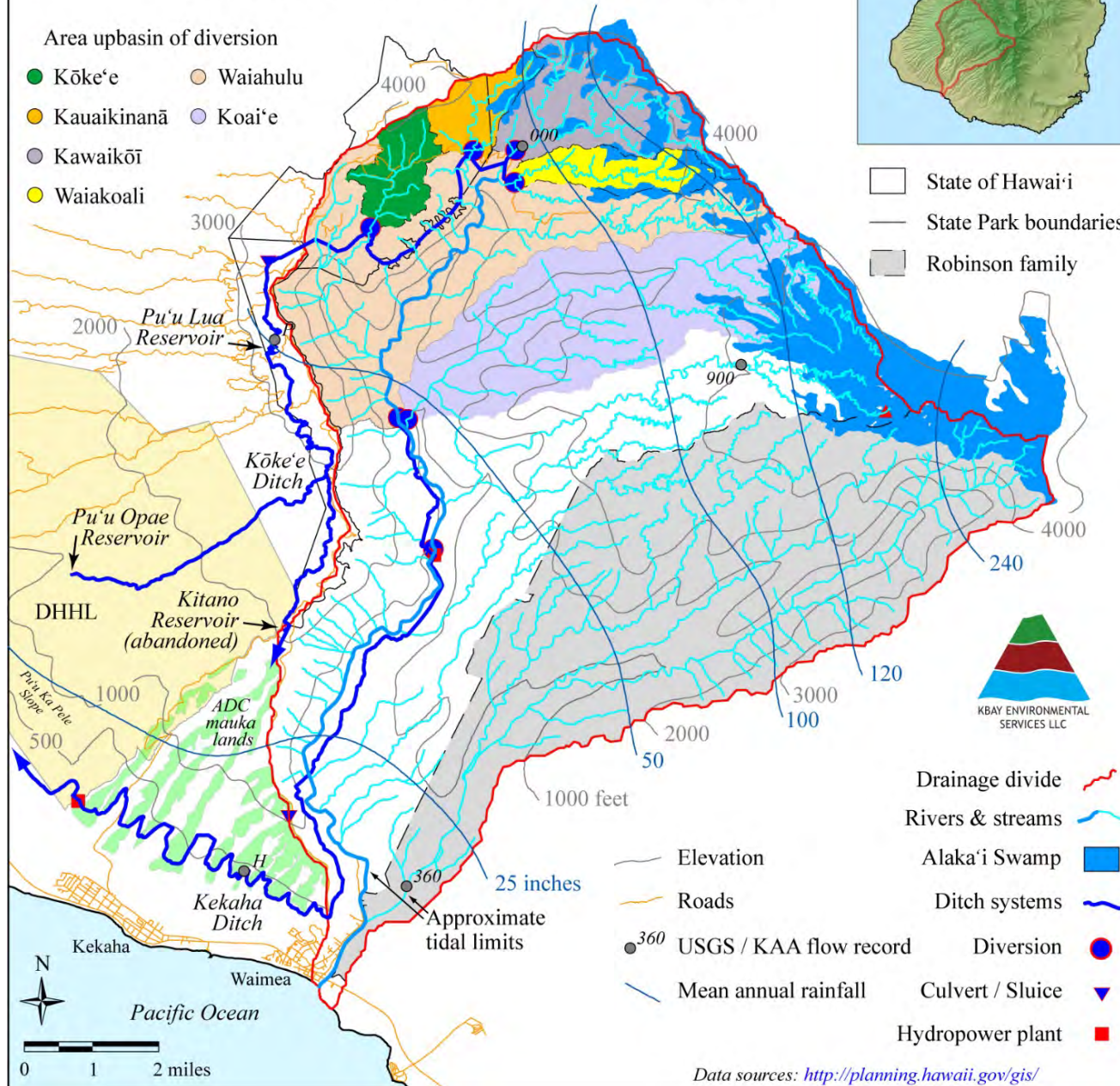
WAIMEA RIVER WATERSHED



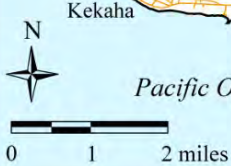
Area upbasin of diversion

- Kōke'e
- Kauaikinanā
- Kawai'ōi
- Waiakoali
- Waiahulu
- Koai'e

- State of Hawai'i
- State Park boundaries
- Robinson family

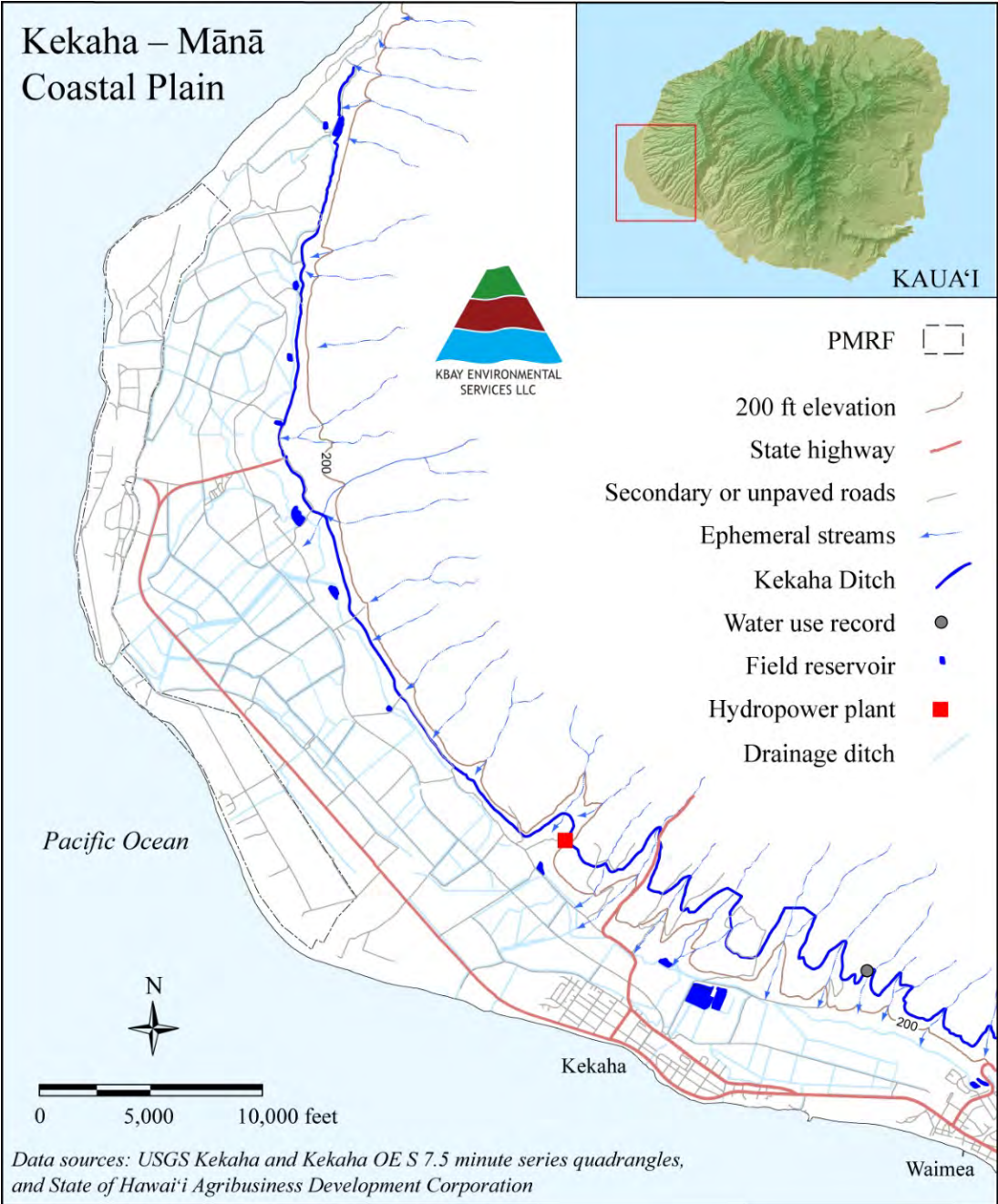
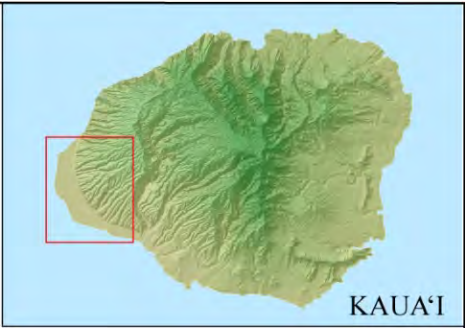


- Drainage divide
- Rivers & streams
- Alaka'i Swamp
- Ditch systems
- Diversion
- ▼ Culvert / Sluice
- Hydropower plant

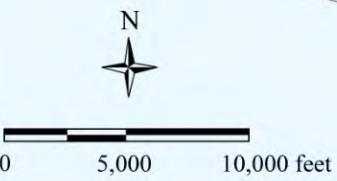


Data sources: <http://planning.hawaii.gov/gis/>

Kekaha – Mānā Coastal Plain



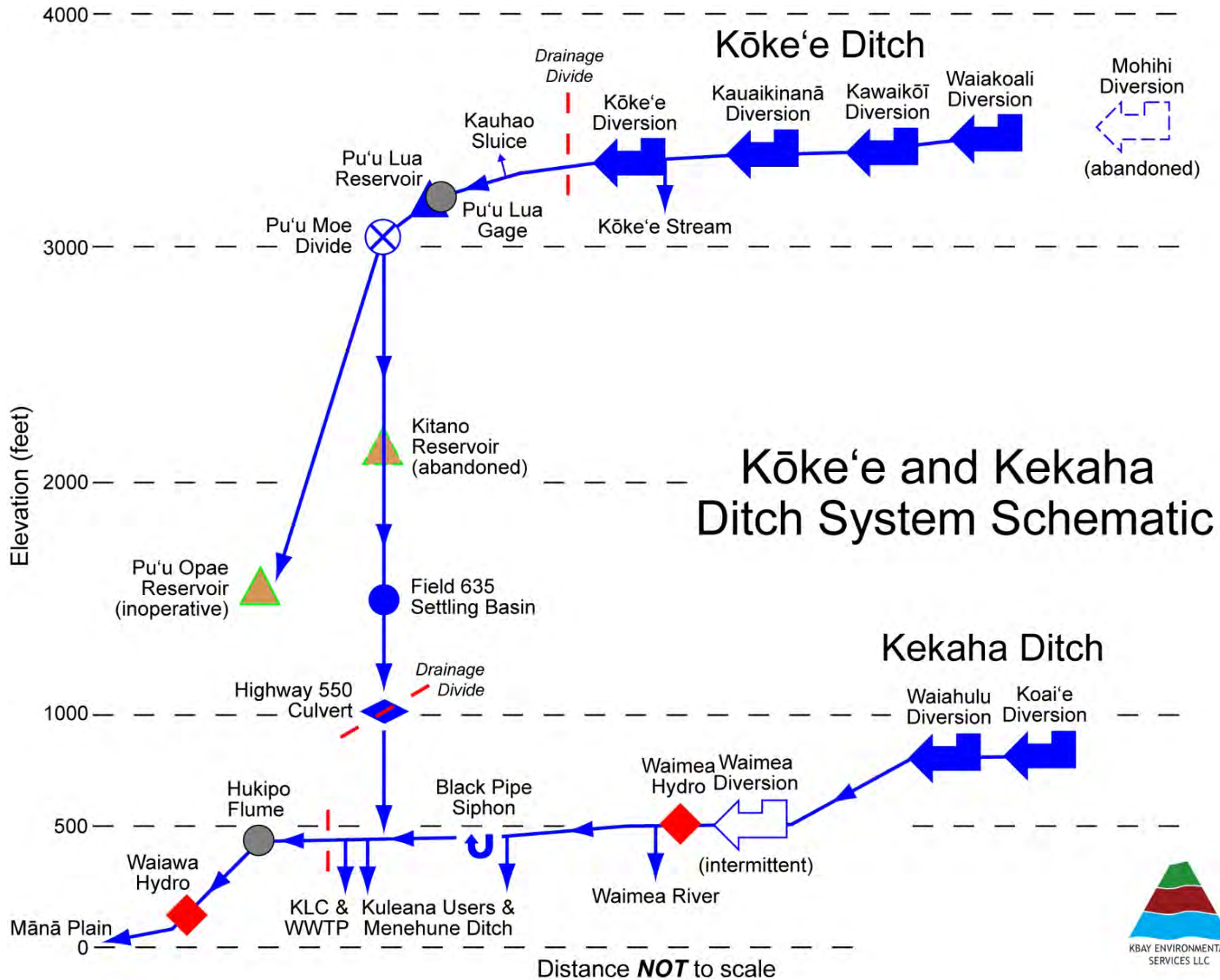
- PMRF []
- 200 ft elevation []
- State highway []
- Secondary or unpaved roads []
- Ephemeral streams []
- Kekaha Ditch []
- Water use record []
- Field reservoir []
- Hydropower plant []
- Drainage ditch []



Data sources: USGS Kekaha and Kekaha OE S 7.5 minute series quadrangles, and State of Hawai'i Agribusiness Development Corporation

Irrigation Infrastructure

- * Extensive irrigation system for water delivery and storage
 - * Surface water, ditches, reservoirs (Puu Lua, Kitano, Puu Opae)
 - * Groundwater, pumps, filters
- * Kekaha system (1907)
 - * Three diversions (Waiahulu, Koaie, Waimea)
 - * 27 miles of ditches, tunnels, flumes and syphon
- * Kokee system (1926)
 - * Four diversions (Kauaikinana, Kawaikoi, Waiakoali, Kokee)
 - * 21 miles of ditches, tunnels, flumes and syphon
- * Two systems are physically connected and in same watershed



Drainage Infrastructure

- * 40 miles of canals and ditches serving Kekaha region
 - * Pumping stations (Kawaiele, Nohili, Kekaha)
 - * Ravines, canals, drainage channels
 - * Electric and mechanical equipment
- * Pumps lower groundwater table for farming
- * Drainage system prevents flooding of PMRF and local communities
- * Pumps move irrigation water for farming
- * Pumps run on power generated by KAA hydros
- * Drainage system water released to Pacific Ocean

Electrical Infrastructure

- * KAA hydros make electricity to power pumps for essential functions
 - * Pumps lower groundwater table for farming
 - * Drainage system prevents flooding of PMRF and local communities
 - * Pumps move irrigation water for farming
- * Mauka hydro (1911, 1959, 2002)
 - * Upper Kekaha ditch system in Waimea Canyon
 - * 1.2 MW capacity
- * Waiawa hydro (1908)
 - * Lower Kekaha ditch system on Mana Plain
 - * 500 kW capacity
- * KAA maintains 29 miles of electrical distribution lines
- * The two KAA hydros supply 10% of KIUC's renewable energy

Planned Improvements to Ditch Systems

Planned Improvements – 2015 Kekaha Ditch System

- * To date KAA has spent approximately \$8 million on ditch system and agricultural infrastructure improvements

NOTE: THE FOLLOWING IS FOR INFORMATIONAL PURPOSES ONLY. ITEMS ARE PLANNED ONLY AND COMPLETION MAY BE SUBJECT TO VARIOUS CONTINGENCIES. COMPLETION DATES ARE ESTIMATES.

- * Upgrade cable suspension bridge at Waimea hydro (completed)
- * Slipline existing 48” steel Black Pipe Siphon with 32” HDPE pipe, reducing Kekaha ditch capacity from 50 to 23 MGD (est. Aug.-Sept.)



Planned Improvements – 2015

Kekaha Ditch System (con't)

- * Mechanical ditch cleaning (remove silt, rocks, trees, amajo grass) from Waimea intake to Waiawa hydro or beyond, as time permits (est. Aug.-Sept.)
- * Repair ditch leaks (identify, mark, seal, plaster with concrete) from Waimea intake to Waiawa hydro as time permits (est. Aug.-Sept.)
- * Replace lumber on tunnel openings between Kukui trail and Waiahulu (est. Oct.)



Planned Improvements – 2015

Kokee Ditch System

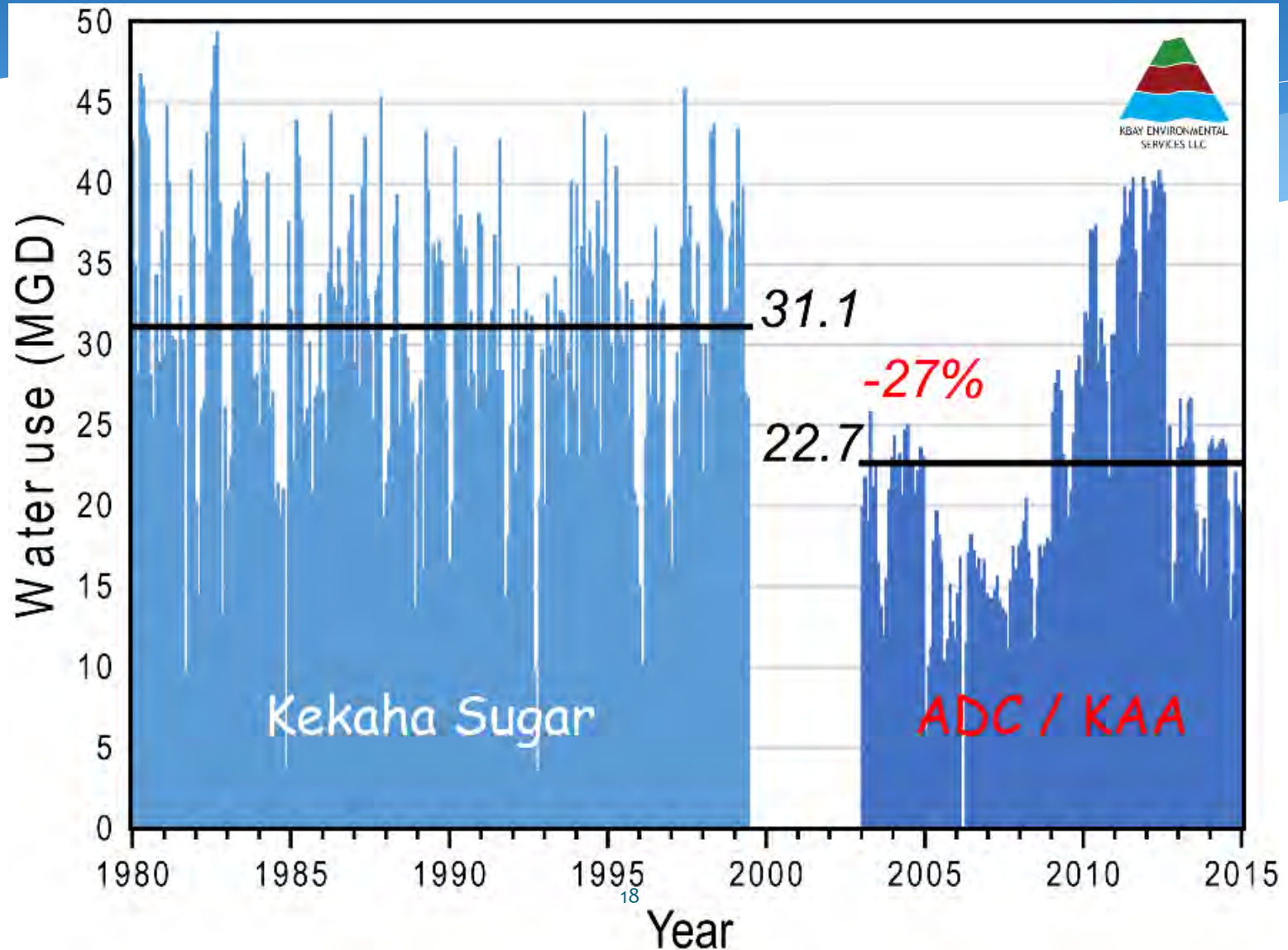
- * Replace Menehune ditch pipeline (completed)
- * Install Waimea Canyon Drive culvert for Kokee system tailwater flowing into Kekaha system and Menehune ditch (est. May)
- * Replace lumber on Puu Moe control gate for DHHL (est. June)
- * Repair cat-walk and platform at Kawaikinana intake (est. June)

Diversion and Use of Water for Ditch Systems

Major Reductions in Water Diversion and Use Since Plantation Era

- * Kekaha ditch system
 - * KAA monitors flow at Hukipo flume
 - * KAA reports readings to CWRM
 - * Waiawa hydro uses 21 MGD for essential functions
 - * Pumps lower groundwater table for farming
 - * Drainage system prevents flooding of PMRF and local communities
 - * Pumps move irrigation water for farming
- * Major reduction in water diversion and use
 - * Plantation era monthly average of 31.1 MGD
 - * KAA monthly average is 22.7 MGD (Jan. 2003 to Dec. 2014)
 - * This is a 27% reduction in water diversion and use

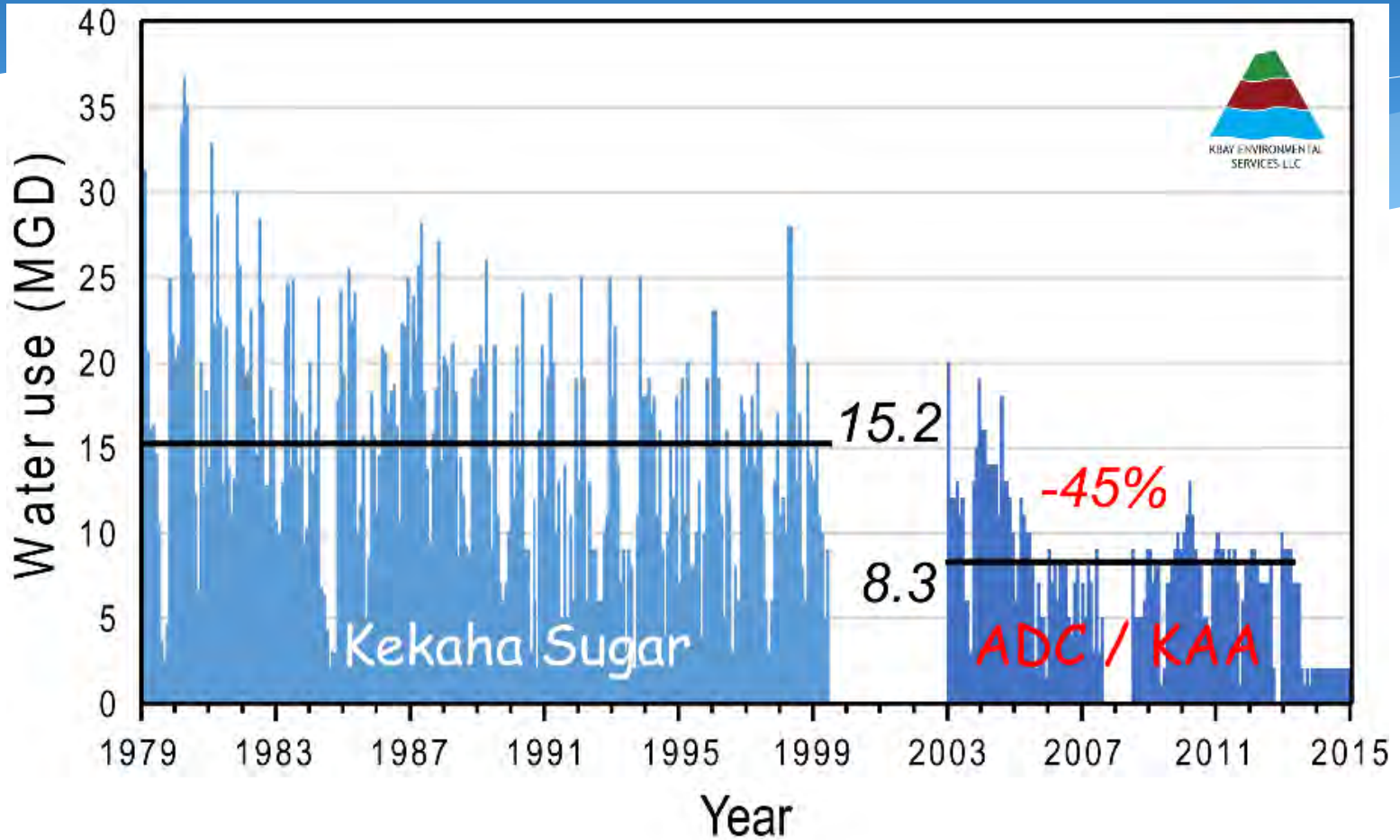
Kekaha – 27% Reduction



Similar Major Reduction for Kokee Ditch System

- * Kokee ditch system
 - * KAA monitors flow at Puu Lua Reservoir
 - * KAA reports readings to CWRM
- * Major reduction in water diversion and use
 - * Plantation era monthly average of 15.2 MGD
 - * KAA monthly average is 8.3 MGD (Jan. 2003 to Dec. 2014)
 - * This is a 45% reduction in water diversion and use

Kokee – 45% Reduction



Mahalo



**KEKAHA AGRICULTURE
ASSOCIATION**

A NON-PROFIT AGRICULTURAL COOPERATIVE
Est. 2003