

National Park Service  
U.S. Department of the Interior



# Kaloko-Honokohau National Historical Park: Threats to Water from Existing and Proposed Withdrawals

September 19, 2012  
Honolulu, Hawaii

EXPERIENCE YOUR AMERICA

THE BOWENIAN STUDY ADVISORY COMMISSION  
Kaliua-Kona, Hawaii  
May 18, 1976

The Secretary of the Interior  
United States Department of the Interior  
Washington, D. C. 20500

Dear Mr. Secretary:

In accordance with the mandate of Public Law 93-366, we respectfully submit to you a study entitled, The Spirit of Kaliua-Honokohau, relating to the feasibility and desirability of establishing, as part of the National Park System, the site of the Honokohau National Historic Landmark and adjacent waters.

The study referred to contains, but is not limited to, findings with respect to the historic, cultural, archeological, historic, and natural values of the resources involved and recommendations for preservation and interpretation of these resources, including the role of native Hawaiians relative to the management and performance of that preservation and interpretation and the providing to them of training opportunities in such management and performance.

We take special pleasure in presenting this study, because perhaps for the first time, native Hawaiians have been able to tell their story and tell it on their own way.

For this opportunity, we asked our members to the Congress of the United States, the Department of the Interior, the National Park Service, and the numerous other people who have contributed their ideas.

*By Kaliua members:*  
*Hopu A. Hoava, George A. Noyes, Robert J. ...*  
*Ray May ...*  
*Henry K. ...*

THE BOWENIAN STUDY ADVISORY COMMISSION



**KA-LOKO  
HONO-KO-HAU**

“...to provide a center for the preservation, interpretation and perpetuation of traditional native Hawaiian activities and culture” [16 U.S.C. §396d(a)]

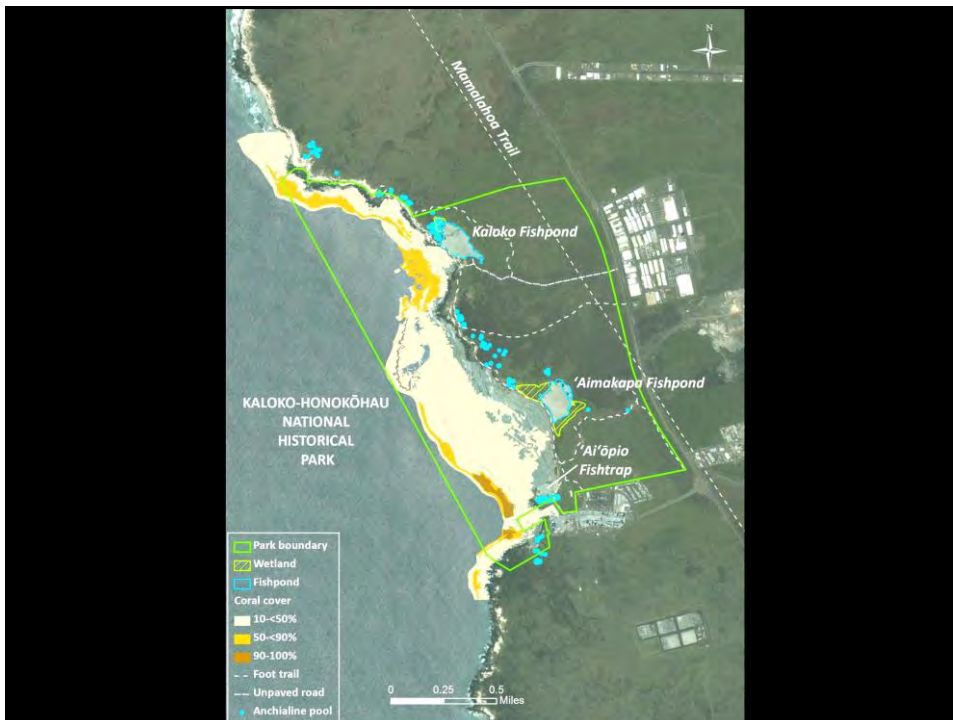


## Annual Children's Festival



*“The dynamic thread that ties the environment together is water...  
What affected the mauka regions, affected the makai...  
What affected the water cycle affected the total environment. This is the way it was and is at Ka-loko, Hono-ko-hau.”*

The Spirit of KA-LOKO HONO-KO-HAU, page 51





## Tide Pools



aholehole or Hawaiian flagtail  
(*Kuhlia sandvicensis*)



limu 'ele'ele or seaweed  
(*Enteromorpha prolifera*)



honu or green sea turtle  
(*Chelonia mydas*)



lolu or sea cucumber  
(*Actinopyga mauritiana*)



'ina kea or sea urchin  
(*Echinometra mathaei*)

## Nearshore Marine



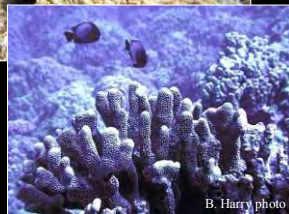
'Ilio-holo-i-ka-uaua  
or Hawaiian monk seal  
(*Monachus schauinslandi*)



mo'i or sixfeeler threadfin  
(*Polydactylus sexfilis*)



Limu kolu or seaweed  
(*Asparagopsis taxiformis*)



Pohaku puna  
or finger coral  
(*Porites compressa*)





## Aiopio Fishtrap



## Anchialine Pools

*pīpīwai*  
or mollusk  
(*Theodoxus cariosus*)



*pīnao 'ula*  
or orange-black  
Hawaiian damselfly  
(*Megalagrion xanthomelas*)



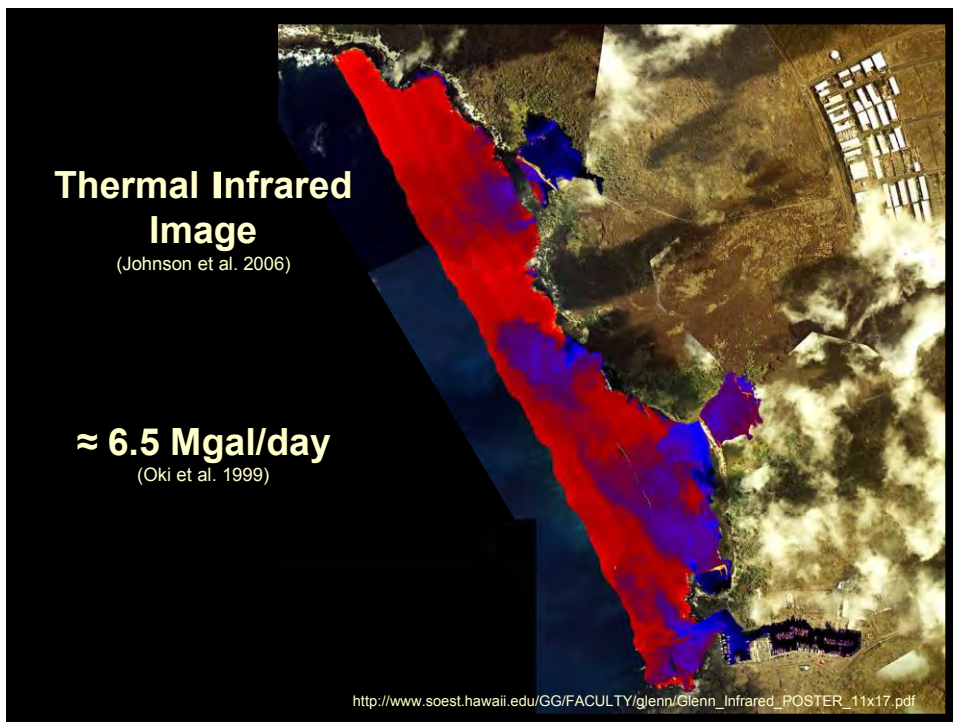
*'ōpae 'ula* or red shrimp  
(*Halocaridina rubra* & *Metabateaus lohena*)



*“Good water quality is essential to fishpond culture, and since the source is almost entirely in the rainy mauka areas, management of these and other lands adjacent to the park will have a direct impact on water resources within the park.*

*Thus, cooperative planning efforts with the state, county, and private landowners is an important part of this proposal.”*

The Spirit of KA-LOKO HONO-KO-HAU, page 29



## ■ July 2001

*“As far as I'm concerned it is critical that all that we have in the groundwater supply be maintained in perfect condition for the sake of our people that are living in this area. The time will come when they will need that and we cannot afford to jeopardize our marine life along the shorelines.”*

Testimony of David Kahelemauna Roy Jr., LUC Docket A00-732

## ■ February 2002

*“Any impacts to waters in the National Park would, in and of itself, be an impact to cultural resources.”*

LUC Docket A00-732, Finding of Fact 190

# Mahalo

## ■ November 2010

- Hawaii county overwhelmingly voted to **amend the County Charter** to conserve and protect Hawaii's natural beauty and all natural and cultural resources.

## ■ September 2011

- Office of Hawaiian Affairs ...

## ■ October 2011

- Association of Hawaiian Civic Clubs ...

Passed resolutions encouraging all stakeholders to actively work to protect natural and cultural resources that are dependent on the Keauhou Aquifer.

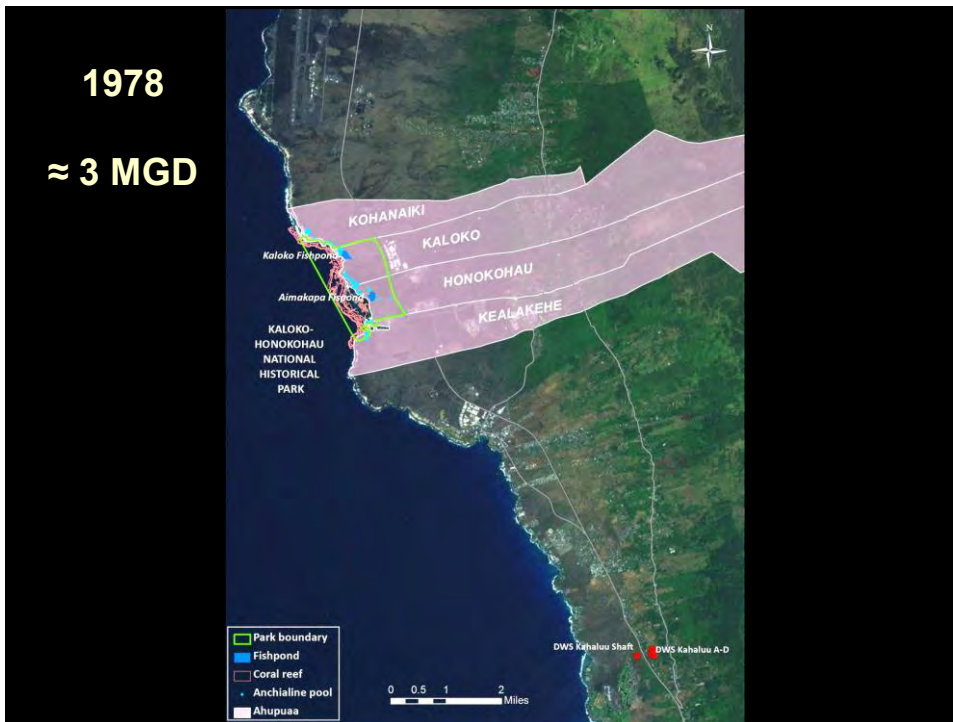
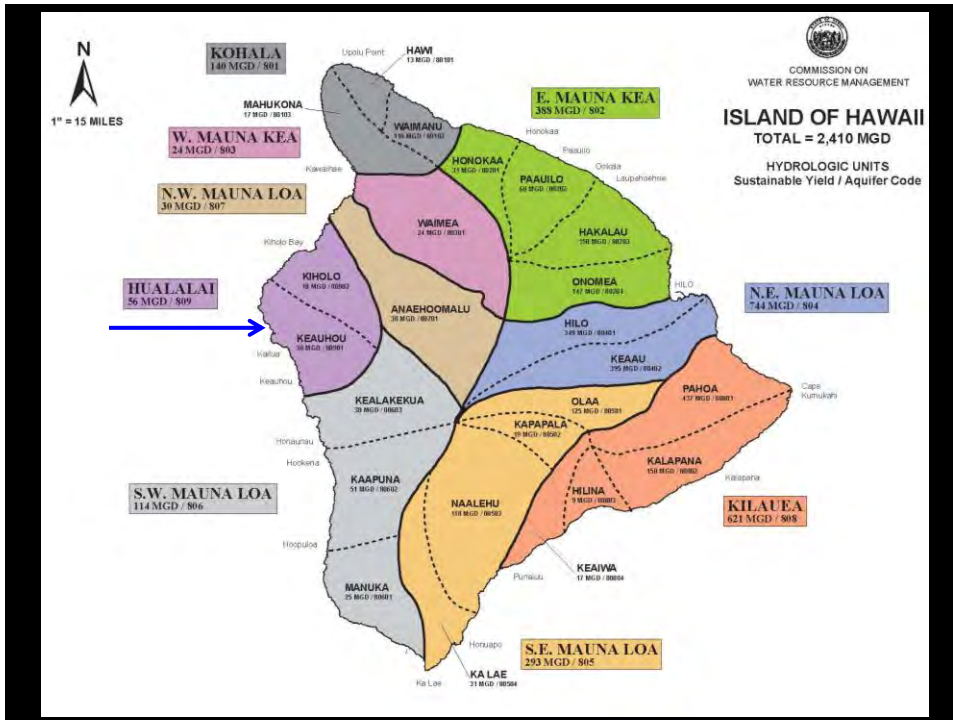


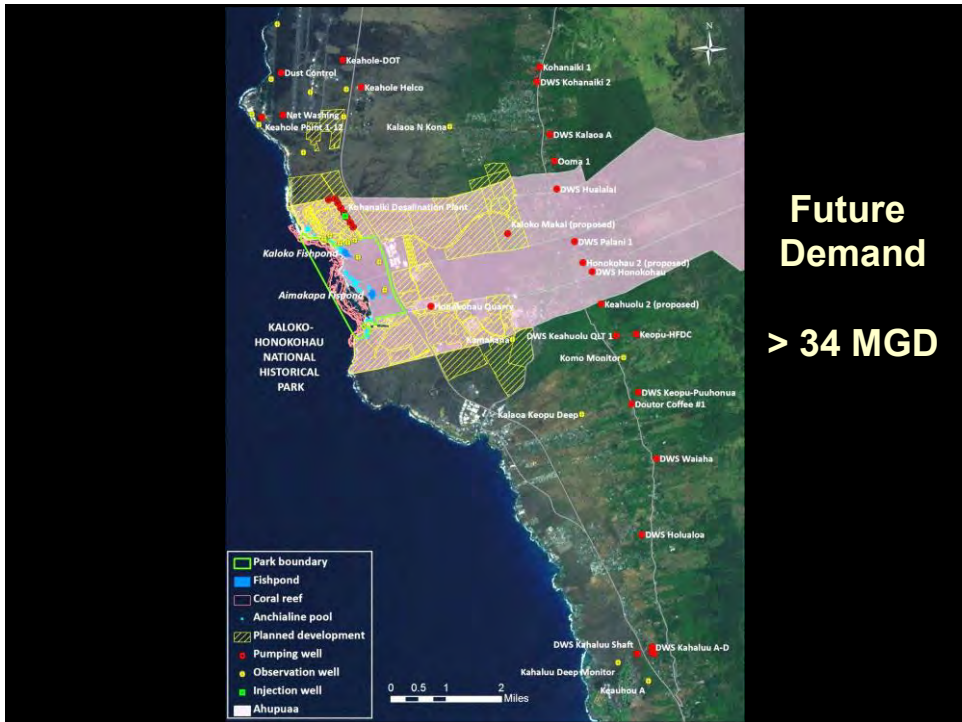
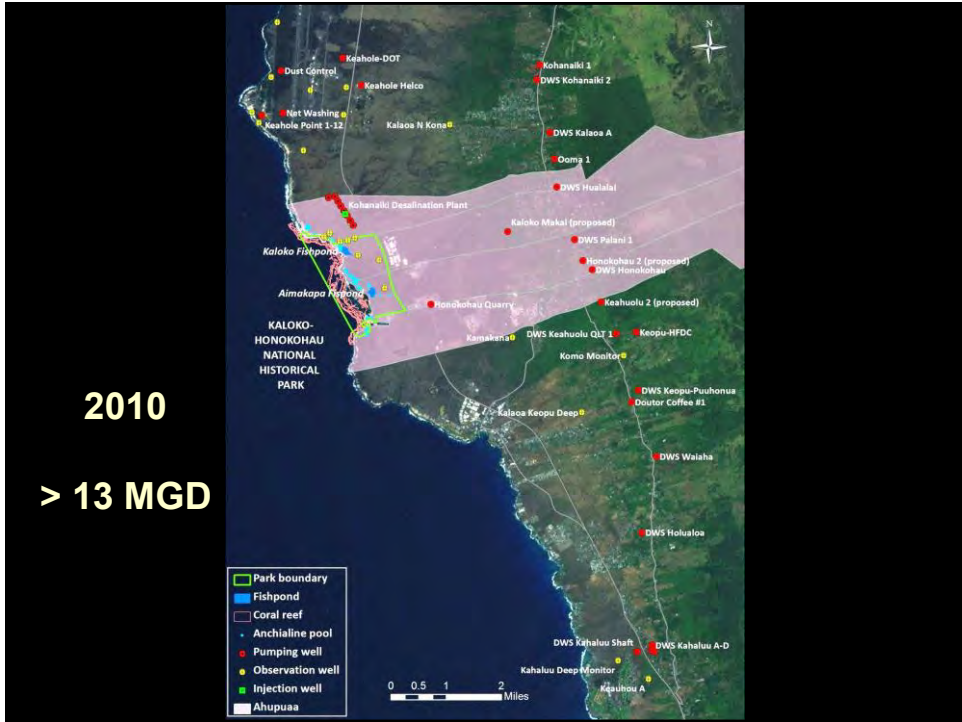


## Potential Impacts to Cultural and Natural Resources

*“Decreases in SGD over time could have serious implications ranging in scale from that of individual organisms to entire ecosystems. These disturbances may significantly alter the chemical properties of coastal waters endangering unique plants and animal species with ecological, cultural, and economic value.”*

The Economic Research Organization at the University of Hawaii  
(Duarte et al. 2010)

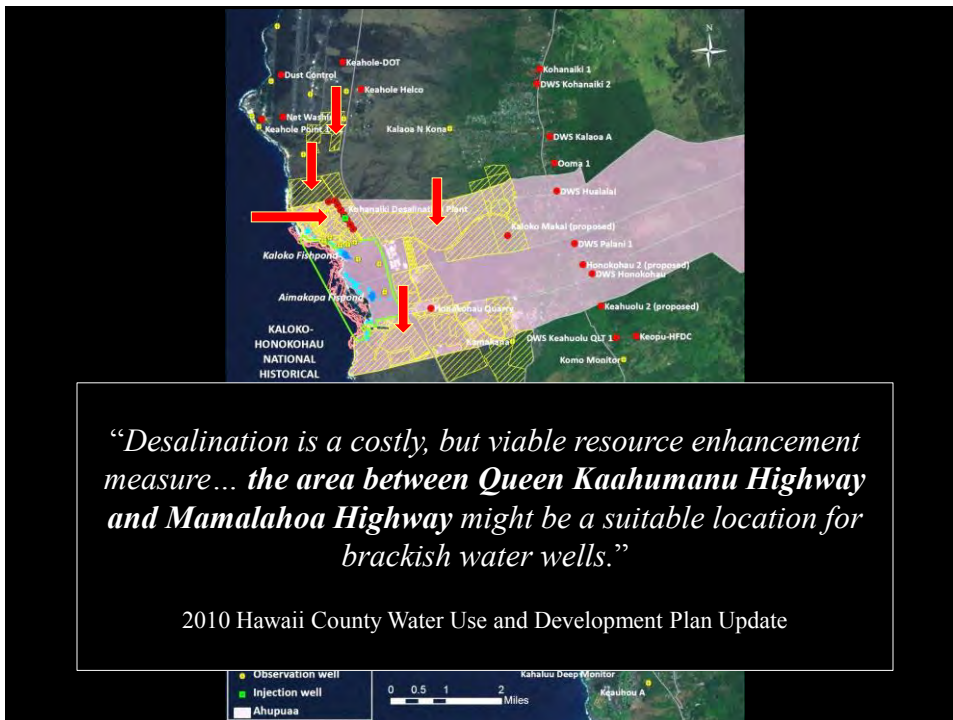




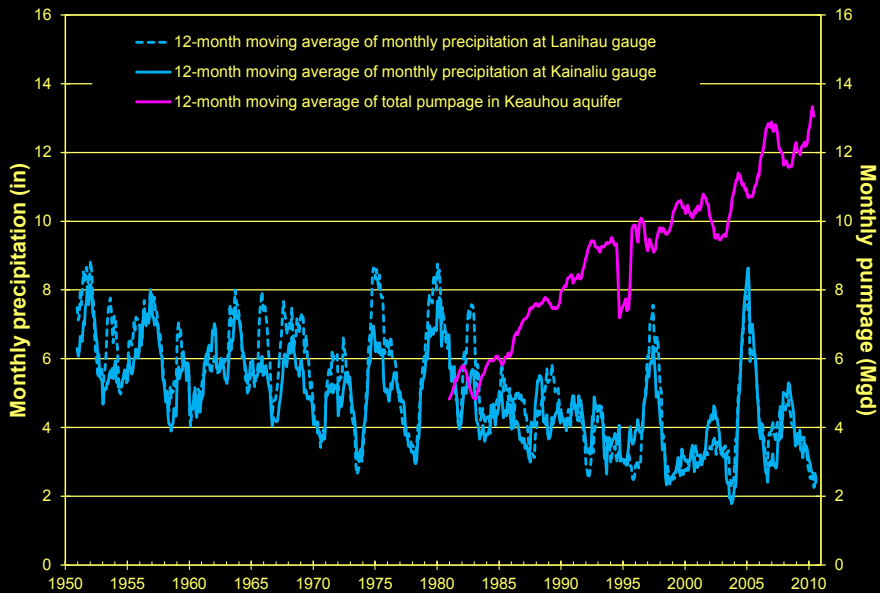


*“Withdrawals from wells directly upgradient of the Park had the greatest effect on the model-calculated freshwater coastal discharge within the Park . . .”*

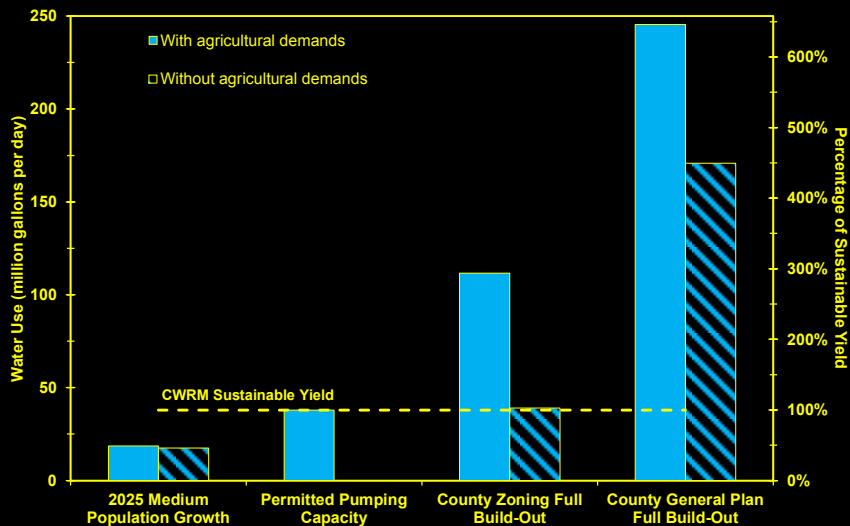
USGS Water Resources Investigation Report 99-4070  
(Oki et al. 1999)



## Declining Rainfall



## Water Demand



**Kona's Housing Room?**  
POSTED: 01:59 a.m. EST, Oct 17, 2010

StarAdvertiser.com

Developers on the Big Island are poised to resume major residential and resort projects that have been stalled because of the slow economy

By Andrew Gomes



Ads by Google

Shipping to Hawaii Guardian Provides Low Cost Shipping to Hawaii - We Make it Simple!  
USShipGuardian.com/Shipping-Hawaii

Hawaii's housing market is still pretty much trying to work out of

## *16,000 homes are planned or being built in North Kona*

**Honolulu Star Advertiser, October 17, 2010**

"This is where you got the opportunity for planned growth," Carr said.

Some observers question whether all the projects will be built as planned, given the ups and downs of the economy and demand. But developers and county officials say there is great need for work force housing in the area close to major resorts along the Kona and Kohala coasts.

Several of the projects began seeking government approvals several years ago in anticipation of finishing homes before the global financial crisis and economic recession ended the housing boom. Some are tangled in financing issues or have delayed construction to time the next market upswing. Others are pushing ahead with permitting in anticipation that strong demand for homes will resume.

### **MAJOR GROWTH PLANNED**

At least nine residential projects mostly in the planning stages are slated for development in North Kona on the Big Island, and would add roughly 16,000 homes to the region.

## HAWAII COUNTY WATER USE AND DEVELOPMENT PLAN UPDATE

Hawaii Water Plan

August 2010

FINAL REPORT

## *Water consumption in North Kona is 1000 gal/d per single family residential unit*

**2010 Hawaii County Water Use and Development Plan Update**

Funded by the:  
**Department of Water Supply**  
For the:  
**County of Hawaii**

**FIKUNAGA & ASSOCIATES, INC.**  
Consulting Engineers  
1311 Puuoa Road, Suite 100  
Honolulu, Hawaii 96814  
(808) 944-1111



## Sustainable Yield

- Did not explicitly consider the quality and quantity of groundwater needed to preserve and perpetuate **traditional and customary Native Hawaiian practices and public trust resources**.
- Does not take into account **declining rainfall**.
- Allows a 44% reduction in groundwater discharge **everywhere** along Kona Coast.
- Limiting pumping to the SY **will not prevent saltwater intrusion** in Kaloko-Honokohau NHP.

## Conceptual Models

- 100% connection
- $0\% < \text{connection} < 100\%$
- 0% connection

Draft Environmental Impact Statement

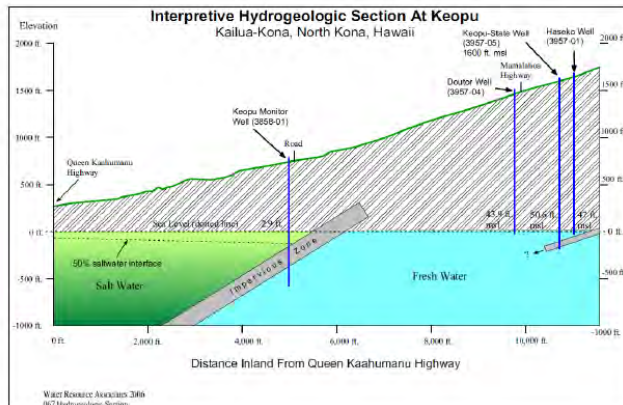
**Kaloko Makai**  
Kaloko and Kohanaihi, North Kona,  
Island of Hawai'i

Volume 1 of 2

Prepared For:  
SCD-TSA Kaloko Makai, LLC

Prepared By:  
Wilson Okamoto Corporation and  
Ho'okuleana LLC

July 2011



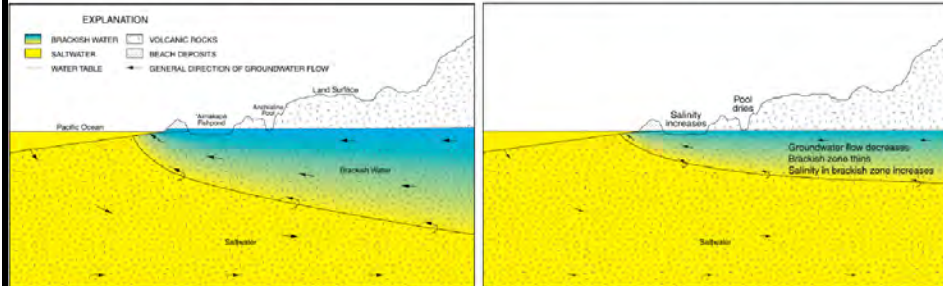
## Sustainable Yield? / Conceptual Model?

- Groundwater-dependent cultural and natural resources in Kaloko-Honokohau NHP are **vulnerable to the impacts of pumping wells**
- Wells continue to be located near sensitive cultural and environmental sites

# Hydrologic Effects of Withdrawal on Non-Drinking Water Resources

Current condition

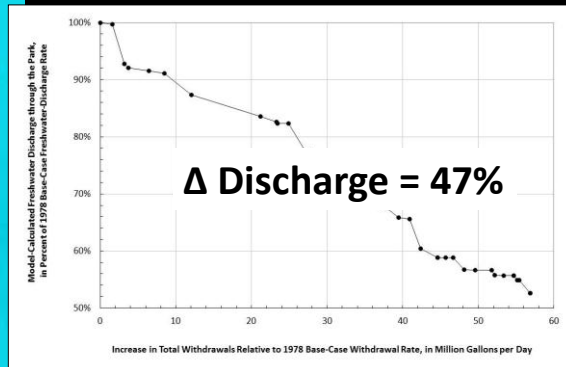
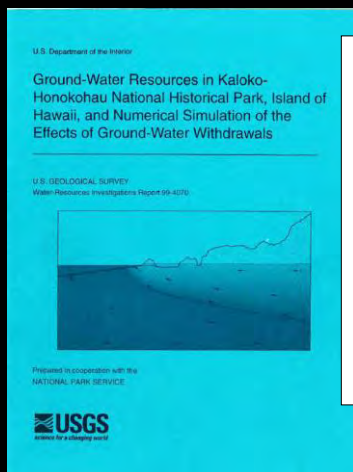
Increased withdrawal



- Groundwater levels decline
  - Anchialine pools may dry up
  - Fishponds may get shallower
- Salinity increases
- Groundwater flow rate decreases

USGS Courtesy of S. Anthony, USGS, 2012

# Simulated Reduction in Freshwater Discharge



$\Delta WL = 0.6 \text{ ft}$



# Indicators of Ecosystem Health

- **Anchialine Pools – Orange-Black Hawaiian Damselfly**



Eggs and larva sensitive to increased temperature & salinity, no larva survive > 15 ppt in lab (Tango 2010)

- **Kaloko Fishpond – Striped Mullet**



Juveniles and fingerlings prefer estuary-like conditions, traditional fishponds may need further protection (Nishimoto et al. 2007)

- **Intertidal Zone – Limu manaua**



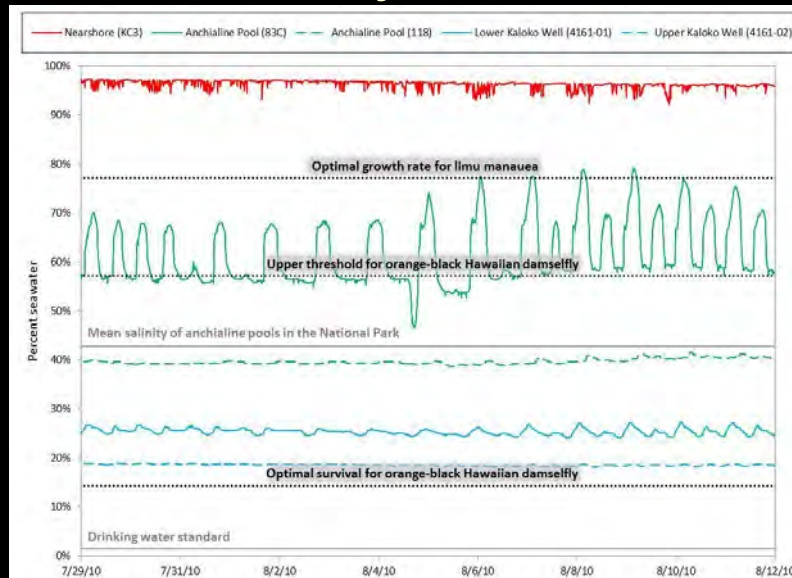
Optimal productivity is salinity dependent, excessive withdrawals may limit distribution (Amato 2009; Duarte et al. 2010)

- **Marine Waters – Coral reef**



Cold submarine groundwater discharge may buffer coral from bleaching (Grossman et al. 2010)

## Maintain Productivity, Distribution, Habitat



(D. Oki, USGS, pers. comm., 2012; E. Grossman, USGS, pers. comm., 2012; Amato 2009; Tango 2010)

## **Precautionary Principle**

- **NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values.**
- **Principle emphasizes science-informed prudence and restraint, and requires the NPS to err on the side of preservation.**

## **Sustainability Goals**

- **Maintain healthy, resilient ecosystems, that can adapt to a changing climate and support subsistence fishing and shoreline food gathering.**
- **Locate wells/manage withdrawals with explicit consideration for the potential impacts to Native Hawaiian traditional & customary practices and public trust resources.**



*“If we don't allow our freshwaters to produce the proper quantity of fish we're not going to have our traditional practices. One leads to the other. Gathering rights begin right there, preservation of the shoreline.”*

Testimony of David Kahelemauna Roy Jr.,  
LUC Docket A00-732

