S. HRG. 114–478

OPPORTUNITIES FOR FEDERAL AND NON-FEDERAL PARTNERSHIPS IN INTEGRATED WATER MANAGEMENT AND EFFORTS TO IMPROVE WATER SECURITY IN HAWAII

FIELD HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

OCTOBER 18, 2016

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CONTENTS

OPENING STATEMENTS

Page

Hirono, Hon. Mazie K., a U.S. Senator from Hawaii 1

WITNESS

Ige, Hon. David, Governor, State of Hawaii 4
Gabbard, Hon. Mike, State Senate, State of Hawaii 9
Yamane, Hon. Ryan, State House of Representatives, State of Hawaii 13
Anthony, Stephen, Director, Pacific Islands Water Science Center, U.S. Geological Survey 17
Moore, Randy, Regional Forester, Pacific Southwest Region, Forest Service, U.S. Department of Agriculture 22
Smith, David, Administrator, Division of Forestry and Wildlife, Department of Land and Natural Resources, State of Hawaii 34
Gonser, Matthew, Extension Agent, Community Planning and Design, University of Hawaii Sea Grant College Program 47
Menard, Trae, Chair, Hawaii Association of Watershed Partnerships, and The Nature Conservancy 54
Gon, Dr. Sam, Senior Scientist and Cultural Advisor, The Nature Conservancy of Hawaii 58

ALPHABETICAL LISTING AND APPENDIX MATERIAL SUBMITTED

Anthony, Stephen:
Statement for the Record 17
Written Statement 19
Gabbard, Hon. Mike:
Statement for the Record 9
Written Statement 11
Gon, Dr. Sam:
Statement for the Record 58
Written Statement 60
Gonser, Matthew:
Statement for the Record 47
Written Statement 49
Hirono, Hon. Mazie K.:
Opening Statement 1
Ige, Hon. David:
Statement for the Record 4
Written Statement 6
Menard, Trae:
Statement for the Record 54
Written Statement 56
Moore, Randy:
Statement for the Record 22
Written Statement 24
Smith, David:
Statement for the Record 34
Written Statement 36
Yamane, Hon. Ryan:
Statement for the Record 13
Written Statement 15

OPPORTUNITIES FOR FEDERAL AND NON-FEDERAL PARTNERSHIPS IN INTEGRATED WATER MANAGEMENT AND EFFORTS TO IMPROVE WATER SECURITY IN HAWAII

TUESDAY, OCTOBER 18, 2016

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The Committee met, pursuant to notice, at 10:01 a.m. HST at the Hawaii State Capitol, Honolulu, Hawaii, Hon. Mazie K. Hirono, presiding.

OPENING STATEMENT OF HON. MAZIE K. HIRONO, U.S. SENATOR FROM HAWAII

Senator HIRONO [presiding]: Good morning, everyone.

It is nice to see so many of you. Aloha.

[Group respond: Aloha.]

Senator HIRONO. Good. We have to start with that, you know, to get the mood going.

Welcome to this important field hearing of the Senate Energy and Natural Resources Committee.

I would like to start by thanking the Committee Chair, Senator Lisa Murkowski, and Ranking Member, Senator Maria Cantwell, for recognizing the importance of this issue for Hawaii and scheduling this field hearing.

I would like to also thank their staff who have worked with my staff to prepare for this field hearing, and I welcome the two Committee staff who traveled here from Washington, DC, hard job, to join us. [Laughter.]

Could you raise your hands, our two staff members from the Committee?

Today we have an opportunity to explore how organizations and Federal, State, and local governments can work together to protect Hawaii's native forested watersheds. A watershed is quite simply an area of land, such as a mountain or valley, which collects rainwater into a common outlet. In Hawaii the most common outlet is the ocean, but some of our rainwater is absorbed by plants, some percolates into underground aquifers and some flows into surface rivers and streams. Native forests are a critical component of how a watershed can collect rainwater.

Fog condensing on trees up high in the mountain regions can increase the collection and absorption in our watersheds by up to 30 percent annually. This is particularly important in Hawaii where

we depend on ground water for 94 percent of our public water supply, the highest rate in the country. We need water to survive and in Hawaii the health of our watersheds is deeply connected to our way of life.

Although there are 72 watersheds on Oahu, the Ko'olau Mountain Range provides nearly half of our drinking water and generates up to $14 billion to our economy every year.

The stakes are clear. We need a holistic approach to water security and to protect our forested watersheds. Forested watersheds supply hundreds of billions of gallons of fresh water every year. Without healthy forests most rainfall would simply run off into the ocean.

As Hawaii's population has grown over the past century, our aquifers have shrunk at an alarming rate. The Pearl Harbor aquifer, which supplies over 60 percent of Oahu's municipal drinking water, has shrunk by 50 percent compared to levels monitored in 1910. A number of issues have contributed to where we are today. Hawaii has been seeing decreased rainfall over the past 30 years.

The proliferation of invasive flora and fauna also poses a growing danger to our forested watersheds. Feral ungulates, such as pigs and goats, increase deforestation, spread invasive plant species, and decrease native flora. Invasive plants also decrease ground water recharge and increase the risk and severity of wildfire.

In East Hawaii strawberry guava forests reduce ground water recharge by 85 million gallons per day, enough to fill 128 Olympic-sized swimming pools every single day. Native Hawaiian forests, by comparison, are 30 to 50 percent more efficient at recharging aquifers than strawberry guava forests. Meanwhile, an expanding population combined with Hawaii's tourism industry, places increased stress on Hawaii's ground water reserves.

Climate change will accelerate these issues and create new ones. As temperatures continue to rise we face the prospect of salt water intrusion into ground water as well as increased evaporation and drought. Fortunately, Hawaii has also proven to be an incubator for innovative strategies to protect our forested watersheds.

The East Maui Watershed Partnership, established in 1991, connects private landowners with Federal and state resources for conservation. Over the past two decades we have exported the East Maui model to encompass ten partnerships across the state.

The Hawaii Community Foundation is also doing excellent work to promote water security in Hawaii. Recently, in 2013, they organized the Hawaii Fresh Water Initiative which brought together a range of stakeholders to identify a goal of generating an additional 100 million gallons of fresh water per day by 2030. In 2015 they published a blueprint for action that lays out a number of steps we can take over the coming years to help achieve this goal. I am certainly looking forward to working with them to accomplish our shared goals.

Another recent example of what can happen through conservation partnerships is Hawaii's Island Forests at Risk Collaborative Landscape Proposal. I worked hard with the National Park Service, the Fish and Wildlife Service, the Forest Service and the Interior Department to ensure that this proposal was included in the President's budget. This proposal, which has received Federal funding in

the President's budget now for two years from the Land and Water Conservation Fund, includes 13 Federal, state and local partners and seeks to expand protected habitat here in Hawaii.

The Land and Water Conservation Fund is a very important fund, and it is authorized by the Committee that is holding this hearing. Earlier this year we successfully passed permanent funding authorization for the Land and Conservation Fund, both through this Committee and in the Senate bipartisan energy bill. I will continue to work closely with my Senate colleagues to ensure that permanent authorization becomes law. This Land and Water Conservation Fund, as a lot of you know, is a very popular fund, but it is not permanent. It is huge progress for us to make this a permanent fund.

Protecting Hawaii's water at the source is critical to safeguarding Hawaii's water security. I am interested in hearing from all of our witnesses today about the many programs underway at the Federal, state and local levels to protect Hawaii's forested watershed. I hope our discussion will provide some new and creative ideas about how the Federal Government can partner and support these initiatives, and I am committed to continuing my work on this Committee to support those initiatives.

We have some very knowledgeable witnesses and leaders joining us this morning. It is organized into three panels, comprised in the first panel of the Governor and members of our state legislature. The second panel comprises Federal and state agency officials, and the third panel is comprised of local stakeholders.

Governor Ige, you have made watershed protection a priority for the state, as was made clear with your announcement at the IUCN World Conservation Congress held in Hawaii recently, to protect 30 percent of Hawaii's priority watersheds by 2030. I know that you cannot stay for the full hearing, but I do appreciate you changing your schedule to join us today to share your views.

I also want to welcome Senator Mike Gabbard, Chair of the Senate Committee on Water, Land and Agriculture. Senator, I know you have recently had some bills come through your committee that are relevant to today's hearing, including one that sets ambitious standards for water reuse and reclamation and another that establishes the Water Security Advisory Group that will support water innovation.

I also want to welcome Representative Yamane, Chair of the State House Water and Land Committee. Your committee has also been very hard at work on various water bills during this past legislature, and you note in your testimony that the number and diversity of water bills that recently passed are really at the forefront of what we need to do to address our water security needs.

So I commend all of you for your leadership.

Here is how this works. You see the light in front of you? Okay. You will each have five minutes for your opening statement, and the lights will signal how much time you have remaining. When you see the yellow light that means you have two minutes to go, and of course, when the red light goes on, that is it. [Laughter.]

Of course, your full written statements will be included in the Committee record.

We will start with you, Governor Ige. Thank you so much for joining us.

STATEMENT OF HON. DAVID IGE, GOVERNOR, STATE OF HAWAII

Governor IGE. Well, thank you, Senator Hirono.

I just wanted to start off of my prepared remarks and thank you for bringing the Committee here and giving all of us, here in Hawaii, an opportunity to really talk about this most important subject.

And you were quite accurate that Senator Gabbard and Representative Yamane had a tremendous session this past session, really focused on water, water security and the general issue of ensuring that we will have clean, fresh water for our citizens forever. And so, I just wanted to start by commending them. You definitely have included two of the best people, the most inspiring advocates for water.

As an island state, Hawaii is completely dependent on internal sources for our supply of fresh, clean water. There are no nearby states from which we can draw to meet our fresh water needs for drinking and agriculture.

Our rainforests play a critical role in the capture and storage of water. Our forests, particularly the Hawaiian Koa-Ohia rainforests, capture moisture from the trade winds and allow it to soak slowly through the layers of trees and ferns and mosses, into our streams and aquifers. When the forests are healthy, our water source is secure and clean. When damaged by invasive species or fire or disease or loss of species, the forest loses its integrity and water-capturing capability. That's why a major component of my administration's Sustainable Hawaii Initiative focuses on watershed protection.

During the World Conservation Congress held in Honolulu last month, I made an ambitious commitment to the global community to protect 30 percent of Hawaii's priority watershed forests by 2030. Currently, about 15 percent of these priority watershed forests are protected.

We can only reach this goal, and go beyond it, through public/private partnerships of landowners and managers who recognize that the best way to protect our forested watersheds and the source of our fresh water is through collaborative management across landscapes. Watershed partnerships are voluntary public/private alliances that allow us to steward native forested watersheds without regard to boundaries. Hawaii has ten active watershed partnerships covering 2.2 million acres, roughly half the land of the entire state. They are helping to plan, identify funding and carry out the dedicated, hard, on-the-ground work that is necessary to combat threats to our forests.

In addition to working with the watershed partnerships, Hawaii has adopted specific policies to protect our water at its source. This year the legislature passed, and I signed, Act 172, establishing a two-year pilot program for a water security advisory group to establish public-private partnerships that increase water security, including increasing ground water recharge.

Federal funding for on-the-ground forest protection by or through the Fish and Wildlife Service, Forest Service, Natural Resources Conservation Service and the National Park Service, along with research conducted by the United States Geological Survey, is absolutely critical to these efforts. We sincerely appreciate the support of the Federal agencies that allow us to stay on track to fund and accomplish watershed protection.

Effective forest management means we have the basic infrastructure and stewardship in place to control the core threats to Hawaii forests. Currently, our greatest threat is a fungal disease called Rapid Ohia Death on Hawaii Island.

The Ohia is the most abundant native tree in the state of Hawaii. It is the core structure of our native forested watersheds. The Ohia provides habitat for many native species and the spiritual and cultural importance of this tree in and to the Hawaiian culture is beyond compare. This fungal disease is currently killing thousands of Ohia trees on Hawaii Island, so far engulfing over 50,000 acres. We have established a Rapid Ohia Death Working Group, made up of numerous public and private partners, including our Federal partners. This group's work is key to advancing research into the cause and extent of the disease and a pilot field project to seek ways to contain the spread of the disease.

This is not the only threat to our forests, which are comprised of native and endangered species. Hawaii is home to one-third of the endangered species listed in the nation. Forty-nine new species were added to Hawaii's list of endangered species this year alone, some of which may have been avoided if adequate funding had been available in the past.

Increased Fish and Wildlife Service endangered species funds, in addition to the proposed "Recovering America's Wildlife Act," can provide urgently needed support for our endangered plants and wildlife and their habitats.

In addition, reauthorization of the Land and Water Conservation Fund will be critical to protecting high priority lands, including watershed lands, from changes in use that would destroy their natural function.

I thank the Committee on Energy and Natural Resources for this opportunity to focus on the threats to and potential support of our native forested watersheds, the source of life here in the Hawaiian Islands.

Thank you.

[The prepared statement of Governor Ige follows:]

Testimony before the U.S. Senate Committee on Energy and Natural Resources

Field Hearing to examine opportunities for federal and non-federal partnerships in integrated water management and efforts to improve water security in Hawai'i

Tuesday, October 18, 2016

Submitted by David Y. Ige, Governor, State of Hawai'i

As an island state, Hawai'i is completely dependent on internal sources for our supply of fresh, clean water. There are no nearby states from which we can draw to meet our fresh water needs for drinking and agriculture.

Our rainforests play a critical role in the capture and storage of water. Our forests, particularly the Hawaiian koa-'ōhi'a rainforests, capture moisture from the trade winds and allow it to soak slowly through layers of trees and ferns and mosses, into our streams and aquifers. When the forests are healthy, our water source is secure and clean. When damaged by invasive species or fire or disease or loss of species, the forest loses its integrity and water-capturing capability. That's why a major component of my administration's Sustainable Hawai'i Initiative focuses on watershed protection.

During the World Conservation Congress held in Honolulu last month, I made an ambitious commitment to the global community to protect 30% of Hawai'i's priority watershed forests by 2030. Currently, 15% of these priority watershed forests are protected.

We can only reach this goal – and go beyond it – through public-private partnerships of landowners and managers who recognize that the best way to protect our forested watersheds and the source of our fresh water is through collaborative management across landscapes. Watershed Partnerships are voluntary public-private alliances that allow us to steward native forested watersheds without regard to boundaries. Hawai'i has 10 active Watershed Partnerships covering 2.2 million acres – roughly half the land in the entire state. They are helping to plan, identify funding, and carry out the dedicated, hard, on-the-ground work that is necessary to combat threats to our forests.

In addition to working with the Watershed Partnerships, Hawai'i has adopted specific policies to protect our water at its source. This year the Legislature passed and I signed Act 172 establishing a two-year pilot program for a water security advisory group to establish public-private partnerships that increase water security, including increasing groundwater recharge.

Federal funding for on-the-ground forest protection by or through the Fish and Wildlife Service, Forest Service, Natural Resources Conservation Service, and the National Park Service, along with research conducted by the United States Geological Service, is absolutely critical to these efforts. We sincerely appreciate the support of the federal agencies that allows us to stay on track to fund and accomplish watershed forest protection.

Effective forest management means we have the basic infrastructure and stewardship in place to control the core threats to Hawai'i's forests. Currently, our greatest threat is a fungal disease called Rapid 'Ōhi'a Death on Hawai'i Island. The 'ohi'a is the most abundant native tree in the state of Hawai'i. It is the core structure of our native forested watersheds. The 'ohi'a provides habitat for many native species, and the spiritual and cultural importance of this tree in and to the Hawaiian culture is beyond compare. This fungal disease is currently killing thousands of 'ōhi'a trees on Hawai'i Island, so far engulfing over 50,000 acres.

We have established a Rapid 'Ōhi'a Death Working Group made up of numerous public and private partners including our federal partners. This group's work is key to advancing research into the causes and extent of the disease, and pilot field projects to seek ways to contain the spread of the disease.

This is not the only threat to our forests, which are comprised of native and endangered species. Hawai'i is home to one-third of the endangered species listed in the nation. Forty-nine new species were added to Hawai'i's list of endangered species this year alone, some of which may have been avoided if adequate funding had been available in the past.

Increased Fish and Wildlife Service endangered species funds, in addition to the proposed "Recovering America's Wildlife Act", can provide urgently needed support for our endangered plants and wildlife and their habitats.

In addition, reauthorization of the Land and Water Conservation Fund will be critical to protecting high priority lands, including watershed lands, from changes in use that would destroy their natural function.

I thank the Committee on Energy and Natural Resources for this opportunity to focus on the threats to and potential support for our native forested watersheds, the source of life here in the Hawaiian Islands.

When the Polynesian people arrived in these islands, they maintained a close connection to the land and sea. They practiced a form of natural resource management that was based on the interrelationship of elements and human beings, including their spiritual beliefs. By exercising careful stewardship, they were able to support a robust population.

Today, our State's Constitution says that "All public natural resources are held in trust by the State for the benefit of the people." The Constitution requires us to conserve and protect Hawai'i's natural beauty and all natural resources for the benefit of present and future generations.

We appreciate your support as we continue to work with our federal and private-sector partners to ensure that we meet our public-trust obligations.

Senator HIRONO. Thank you very much, Governor.

If your schedule means that you need to leave us, I know our Senator and Representative and our guests will understand.

Thank you very much.

Senator Gabbard.

STATEMENT OF HON. MIKE GABBARD, STATE SENATE, STATE OF HAWAII

Mr. GABBARD. Aloha, Senator Hirono, and mahalo nui for the opportunity to provide testimony at this field hearing regarding opportunities for Federal and non-Federal partnerships in integrated water management and efforts to improve water security in Hawaii. I commend the U.S. Senate Committee on Energy and Natural Resources for seeking this input and for looking for ways to collaborate to help our state improve its stewardship of this precious natural resource. As the Chair of the State Senate's Water, Land and Agriculture Committee, I can assure you that this topic will continue to be a top priority in my policymaking efforts.

And as you mentioned in your remarks, Senator, our state had an incredible privilege last month to host the World Conservation Congress for the first time in our nation's history. At that event, which included over 10,000 delegates from 192 countries from around the world, it proved to be a perfect opportunity to showcase our leadership in sustainability through our Aloha and Challenge targets and to forge partnerships for future efforts.

During his opening address at the Congress, Governor Ige announced our state's commitment to protecting 30 percent of our watersheds by 2030. And as you mentioned, the Hawaii Fresh Water Initiative has become a cornerstone of our state's efforts to improve integrated water management and water security in the state. Through this collaborative effort, led by the Hawaii Community Foundation, three aggressive water strategy areas have been identified: conservation, recharge and reuse. The principal goal of the initiative is to create 100 million gallons per day in additional reliable fresh water capacity for our islands by 2030, including recharging our aquifers through rainwater capture with a goal of 30 million gallons a day. Achieving these ambitious goals is directly tied to the successful stewardship of our watershed areas.

On June 30th I participated in a bill signing ceremony for seven water supply-related bills. This is the most water-related bills in memory and the direct result of a close partnership between the Water and Land Committee in the House and our Committee in the Senate. I assure you that this issue will remain at the forefront in coming sessions.

A few of the highlights include:

Act 169, of Senate Bill 2645 provides funding for and requires the adoption of a five-year statewide water loss audit program to encourage our water utilities to track leaks and prevent water waste.

Act 170, which was House Bill 1749, amends the Hawaii State Water Plan to include the utilization of reclaimed water at all state and county facilities for all uses other than potable/drinking water needs. The new law sets an ambitious goal for the water sector just

as Hawaii has adopted a nation leading standard around 100 percent renewable energy.

Act 172, House Bill 2040, establishes a two-year Natural Capital Investment Partnership under the State Department of Land and Natural Resources to spur water innovation and public/private partnerships in the water sector.

So as we look to our future priorities, it's important that the State and Federal Governments provide sufficient financial resources to enable our Watershed Partnerships and the state DLNR to protect more of our watershed forests. We should also continue to encourage the EPA and the State Department of Health to work together to find good uses for the funding available through the Drinking Water State Revolving Fund.

Going beyond state and county buildings, we need to update our plumbing and building codes to include the latest efficiency and reuse potential and conserve our water resources. The State Legislature will also revisit legislation to create a program that offers incentives to local residents who invest in water conservation systems.

This field hearing is a welcome addition to the dialog about how Hawaii can begin to lead in creating holistic, integrated solutions to our water challenges. With the impacts of climate change already altering our reality in the Islands, the Legislature will continue to take water seriously and to the best of our ability, push aggressively to ensure that every drop of water that hits our islands is efficiently captured, distributed and reused where possible.

I am grateful that the Federal Government continues to be a key partner in this effort.

Mahalo, once again, for taking the time and effort to receive this input.

[The prepared statement of Mr. Gabbard follows:]

SENATOR MIKE GABBARD

20TH DISTRICT

KAPOLEI, MAKAKILO,
AND PORTIONS OF EWA, KALAELOA
& WAIPAHU

The Senate

STATE CAPITOL
HONOLULU, HAWAII 96813

CHAIRMAN
WATER, LAND & AGRICULTURE

VICE CHAIR
TRANSPORTATION & ENERGY

MEMBER
JUDICIARY & LABOR
HIGHER EDUCATION & THE ARTS

Written Testimony for U.S. Senate Committee on Energy and Natural Resources Field Hearing
October 18, 2016

Aloha and mahalo for the opportunity to provide testimony on opportunities for federal and non-federal partnerships in integrated water management and efforts to improve water security in Hawai'i. I commend the U.S. Senate Committee on Energy and Natural Resources for seeking this input and looking for ways to collaborate to help our state improve its stewardship of this precious natural resource. As the Chair of the State Senate's Water, Land, and Agriculture Committee, I can assure you that this topic will continue to be a top priority in my policymaking efforts.

Our state had an incredible privilege last month to host the World Conservation Congress for the first time in our nation's history. This event, which included over 10,100 delegates from 192 counties from around the world, proved to be a perfect opportunity to showcase our leadership in sustainability through our Aloha + Challenge targets and to forge partnerships for future efforts. During his Opening Address at the Congress, Governor Ige announced our state's commitment to protecting 30% of our watersheds by 2030.

The Hawai'i Fresh Water Initiative has become a cornerstone of our state's efforts to improve integrated water management and water security in the state. Through this collaborative effort led by the Hawai'i Community Foundation, three aggressive water strategy areas have been identified: conservation, recharge, and reuse. The principal goal of the Initiative is to create 100 million gallons per day in additional, reliable fresh water capacity for our islands by 2030, including recharging our aquifers through rainwater capture with a goal of 30 million gallons a day. Achieving these ambitious goals is directly tied to the successful stewardship of our watershed areas.

The State Legislature has taken the need to focus on fresh water security to heart. On June 30th, I participated in a bill signing ceremony for 7 water supply related bills.

This is the most water-related bills in memory—and the direct result of a close partnership between the Water and Land Committee in the House and our committee in the Senate. The issue will remain at the forefront in coming sessions. A few of the highlights include:

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PHONE: 586-6830 | FAX: 586-6679 | EMAIL: SENGABBARD@CAPITOL.HAWAII.GOV

- **Act 169 (SB 2645)** provides funding for and requires the adoption of a 5-year statewide water loss audit program to encourage our water utilities to track leaks and prevent water waste.
- **Act 170 (HB 1749)** amends the Hawai'i state water plan to include the utilization of reclaimed water at all state and county facilities for all uses other than potable/drinking water needs. The new law sets an ambitious goal for the water sector just as Hawai'i has adopted a nation-leading standard around 100% renewable energy.
- **Act 172 (HB 2040)** establishes a 2-year Natural Capital Investment Partnership under the state Department of Land Natural Resources to spur water innovation and public-private partnerships in the water sector.

As we look to our future priorities, it's important that the state and federal government provide sufficient financial resources to enable our Watershed Partnerships and the state Department of Land and Natural Resources to protect more of our watershed forests. We should also continue to encourage the EPA and state Department of Health to work together to find good uses for the funding available through the Drinking Water State Revolving Fund. Going beyond state and county buildings, we need to update our plumbing and building codes to include the latest efficiency and reuse potential and conserve our water resources. The State Legislature will also revisit legislation to create a program that offers incentives to local residents who invest in water conservation systems.

This field hearing is a welcome addition to the dialogue about how Hawai'i can begin to lead in creating holistic, integrated solutions to our water challenges. With the impacts of climate change already altering our reality in the Islands, the Legislature will continue to take water seriously, and push aggressively to ensure that every drop of water that hits our islands is efficiently captured, distributed, and reused where possible. I'm grateful that the federal government continues to be a key partner in this effort.

Senator HIRONO. Thank you, Senator Gabbard.
Representative Yamane.

STATEMENT OF HON. RYAN YAMANE, STATE HOUSE OF REPRESENTATIVES, STATE OF HAWAII

Mr. YAMANE. Senator, nice to see you again and thank you for bringing this Committee to Hawaii and welcome home.

Senator HIRONO. Thank you.

Mr. YAMANE. Before I begin I would like to highlight that this legislative session, in collaboration with the Senate, took water very seriously. We came up with about 27 bills, and out of that 27 bills we passed 14 into law.

As part of the idea beyond the water essence, we looked at water as being the lifeblood of our island. And together with the Senator, we looked at the whole process, looking at water from the mountains to the sea. So we came up with a wide variety of bills, many of them noted by the previous speakers, which included looking at not only protecting our watershed but also looking at how our water is used on a daily basis.

And I wanted to highlight, Senator, that I was able to go to Texas and California, seeing the extremes. In one area helping with disasters due to flooding and in another area helping in California due to drought with wildfires.

So coming home, working with the Senator, we took water and water access and having clean, fresh water for our use as not only an economic issue, but a cultural and spiritual issue that we needed to address.

So as we move forward knowing that with the concerns with the increase in climate change, with the reduction of rainfall by 19 percent over the last 20 years, we needed to do something now to be ahead of the game and potentially help continue that discussion on water reuse, water capture and water sustainability.

So some of the bills previously highlighted were the issues of doing water audits, looking at water infrastructure loans, so that way we can build and support infrastructure that looks at water irrigation with the concept of using water wisely and actually, prevention and reduction in evaporation so water can reach its goal.

Also we looked at water, not only as recharging our aquifers but also how we use it. And we did do something, I think, that's led the nation in which we passed the first law that bans the discharge of sewage into the oceans within ten years.

Senator, one of the things we wanted to do was make sure that we supported our dams and reservoirs as well as the staff and workers at the Department of Land and Natural Resources. So we also invested $16 million to upgrade and protect our dams and reservoirs so they can be used for local farmers and food production.

Senator, you know, one of the things I would like to highlight is we have a very good relationship with the Federal Government in so many ways and we would like that to continue. We would like to continue the opportunity to work with the Federal Government in investing in water reclamation, water reuse, water metering, storm water recapture and ground water recharging projects.

We also would like to highlight that the Federal water conservation grant, like Water Smart funding, is important to Hawaii and if it can continue and expand it would be greatly appreciated.

I wanted to throw out that we have been working with the Bureau of Reclamation, Army Corps of Engineers, EPA and USDA, National Fish and Wildlife and FEMA and other Federal Government entities and their ability to work in partnership with us is greatly appreciated.

So, thank you.

[The prepared statement of Mr. Yamane follows:]

HOUSE OF REPRESENTATIVES

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

TESTIMONY OF RYAN YAMANE
CHAIR, HOUSE COMMITTEE ON WATER AND LAND
HAWAII STATE LEGISLATURE

BEFORE THE UNITED STATES SENATE COMMITTEE ON
ENERGY AND NATURAL RESOURCES

OCTOBER 18, 2016
10:00 A.M.
HAWAII STATE CAPITOL
CONFEREENCE ROOM 325
415 SOUTH BERETANIA STREET
HONOLULU, HAWAII

RELATING TO FEDERAL AND NON-FEDERAL PARTNERSHIPS IN INTEGRATED WATER MANAGEMENT AND EFFORTS TO IMPROVE WATER SECURITY IN HAWAII

Senator Hirono:

I truly appreciate your efforts to bring this issue to the forefront and to allow Hawaii to have a voice in these proceedings. The time and effort that you and this committee have put into this issue, indicated to us that you share our concerns to protect our water, and the need to improve Hawaii's water security for our people and our environment.

The Hawaii State Legislature finds that the future of our State's water security is vital for Hawaii's economy, natural resources, and to the health and lifestyle of Hawaii's people. However, it must be noted that water is not only required to sustain life, but can also be a threat to life as we have witnessed from the extreme flooding of West Virginia, Texas, Louisiana, and North Carolina, the contamination of water in Flint, Michigan, as well as the severe drought in California. A recent United Nations report on water and disaster risk recounts that 90 percent of U.S. natural disasters over the past decade have been water related, including floods, droughts, and storm surges. Water-related disasters arise from too much water, too little water, or polluted water. The frequency of these water-related disasters is expected to increase with a changing climate, with the U.N. predicting that these disasters also will become more severe in the near future.

As the Earth's temperature continues to rise, we can expect a significant impact on our fresh water supplies with the potential for devastating effects on these resources. If we continue to increase our water consumption, to allow sewage spills to pollute our streams and ocean and do not reclaim our water, we will face a serious water crisis in Hawaii's future The effects on our ahupua'a and natural systems will be widespread: from accelerated flooding, heavier rain and flash floods, to extreme droughts and saltwater intrusion in our aquifers. We in Hawaii have already found that our statewide rainfall has decreased by 19 percent between 1978 and 2007. Similarly, our annual amount of "tradewind days" have decreased from 291 days in 1973, to 210 days in 2009, also resulting in less rain and recharge for our islands' aquifers. Hawaii has already experienced prolonged drought which

severely impacted our State's drinking supply, natural resources, and agricultural production in 2013, when 75 percent of Hawaii's land was found to be "abnormally dry."

This year, my colleagues and I took direct action to improve our water protection policies through a comprehensive package of 14 water laws, which include improved water management policies, establishing a statewide "water audit" program, encouraging hydroelectric opportunities, creating public private partnerships and investment incentives in water security, improving local water infrastructure, and eliminating the discharge of untreated water into our streams and oceans.

To secure our water resources, the Hawaii State Legislature passed legislation to encourage the State's Commission on Water Resource Management to conduct "water audits" with the water utilities and the counties. This water audit will investigate water use, water loss, understand how our water is managed on a statewide scale, and allow the State to forecast our future water supply. The Hawaii State Legislature also initiated and financed a State Water Security Advisory Group as a two-year pilot program which will seek public-private partnerships to fund water security initiatives throughout the State. Similarly, the Hawaii State Legislature created a Green Bond investment program to provide water infrastructure loans to landowners and farmers who wish to improve their water infrastructure and irrigation systems. To encourage more use of reclaimed water, the Hawaii State Legislature amended the Hawaii State Water Plan to use clean, recycled water in all State and County facilities by 2045, excluding drinking water and potable water use. To reduce future pollution of Hawaii's oceans and streams, the Hawaii State Legislature also passed a law which will prohibit wastewater and raw sewage discharge within our ocean and state waters by 2026. To diversify energy opportunities to meet Hawaii's Clean Energy Goal, the Hawaii State Legislature expanded the use of water as a future clean energy resource for hydroelectric power. Finally, the Hawaii State Legislature invested over $16 Million to improve and upgrade dams, reservoirs, and irrigation systems throughout the State of Hawaii.

This diverse legislative package of 14 water laws was a first of its kind in Hawaii. This comprehensive legislative water package is our first step toward ensuring Hawaii's water security and water safety through water reuse, conservation, and infrastructure advancements. However, more needs to be done to ensure that Hawaii's water is safe, clean, and secure for our future. I welcome the Federal Government to invest in water reclamation, water reuse, water metering, stormwater runoff capture and groundwater recharge projects for the State of Hawaii. Federal water conservation grant programs, like the WaterSMART funding initiative can assist the State of Hawaii to improve water conservation and secure our statewide water supply. I am hopeful that this Senate Field Hearing will generate increased involvement and funding opportunities from federal agencies including: the Bureau of Reclamation, the Army Corps of Engineers, the Environmental Protection Agency, the U.S. Department of Agriculture, the National Fish and Wildlife Service, and the Federal Emergency Management Agency.

We are currently witnessing the severity of water risks and water disasters affecting the country and we must acknowledge that Hawaii's future will also be vulnerable to climate change. We must act to invest in federal, state, and county partnerships in integrated water management to improve Hawaii's future water security.

Representative Ryan Yamane
Chair, House Committee on Water and Land
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Senator HIRONO. Thank you very much.

It is clear that your leadership is bearing results and I commend all of you and especially the legislature, the two of you, for leading your two very important committees and focusing on reuse, recharge, infrastructure, all really important, as our water infrastructure all across the country is in a bad state of repair. You are putting in the appropriations which the Governor has to sign into law.

Thank you very much for your partnering, and I look forward to working with all of you to identify Federal resources. It would be great if we could bring more Federal resources, especially in the area of our fight against invasive species, because I recognize that we do not get as much of the pie that we probably should be getting. So we will work together to make that happen.

Mahalo nui, to you all.

Mr. GABBARD. Thank you.

Mr. YAMANE. Thank you.

Senator HIRONO. Thank you.

So we will bring up the second panel.

You are going to be testifying in the order that I will be identifying you. We have Steve Anthony, who is the Director of the Pacific Islands Water Science Center, U.S. Geological Survey (USGS). Randy Moore is a Regional Forester with the Pacific Southwest Region, Forest Service, U.S. Department of Agriculture. David Smith is the Administrator at the Division of Forestry and Wildlife with the Hawaii Department of Land and Natural Resources.

The USGS is part of the Department of the Interior, and it is doing important research in Hawaii and across the Pacific Islands. The Regional Forester, Randy Moore, your division, or your service, is housed within the U.S. Department of Agriculture. So we have Department of the Interior, Department of Agriculture, and then David Smith is with the State Department of Land and Natural Resources (DLNR).

I did have the opportunity last week to meet with DLNR Chair, Suzanne Case, and David to learn more about the Department's responsibility to protect our watersheds.

Welcome to all of you. Let's get started, and we are going to start with you, Steve.

STATEMENT OF STEPHEN ANTHONY, DIRECTOR, PACIFIC ISLANDS WATER SCIENCE CENTER, U.S. GEOLOGICAL SURVEY

Mr. ANTHONY. Senator Hirono, thank you for inviting me to discuss the U.S. Department of the Interior's (DOI) role in integrated water resource management and efforts to improve water security in Hawaii.

In Hawaii, water resources help shape our culture, economy and environment. As climate variability and change continues to stress limited water resources, water security will continue to grow as a national concern. As a result, integrated water-resource management will be critical to support healthy, thriving environments and societies.

The Department, through the U.S. Geological Survey, National Park Service, Pacific Islands Climate Science Center and the Pacific Islands Climate Change Cooperative, is working to bring peo-

ple together to ensure a sustainable and secure water future. Through this process, the Department partners with cultural stewards to help scientists understand culturally sensitive water resources. The Department also works with academic researchers to forecast climate change as potential impacts on water and with watershed managers and state and local agencies to understand how management activities can impact water resources.

As part of this effort, the USGS provides objective science for the nation's water resources to support human well-being, healthy ecosystems, economic prosperity, and to anticipate and help resolve impending water-resource conflicts and emergencies.

The USGS also serves society through water-resource monitoring and research to provide tools that managers and policymakers can use for preserving the quality and quantity of water resources. In Hawaii, the USGS is working in cooperation with the Hawaii Commission on Water Resource Management and other state and local agencies to expand and enhance monitoring of rainfall, ground water, stream flow and water quality, assess ground water recharge and availability, estimate low-flow conditions in our streams needed to establish instream flow standards, quantify the impacts of high-priority non-native and dominant native plant species on freshwater availability and to assess water quality related to land-use activities.

USGS is also developing information tools to evaluate ground water availability on several of the main islands as part of the regional study of the nation's principle aquifers.

With respect to water use, USGS compiles and estimates water use information every five years in cooperation with State, Federal and local agencies.

The USGS is providing a funding opportunity to the state to enhance the understandings of surface water use in Hawaii.

Finally, the USGS is assessing the effects of droughts and other climate variability on water resources.

As mentioned previously, the Hawaii Fresh Water Initiative was launched in 2013 to bring multiple, diverse parties together to develop a forward-thinking and consensus-based strategy to increase water security in Hawaii. Organized by the independent nonprofit Hawaii Community Foundation, the Initiative relied on a blue ribbon advisory panel of experts including farmers, landowners, scientists, conservationists and government officials.

DOI will continue to partner with the public and private sectors in Hawaii to support the understanding of watershed-management activities that affect water security and to develop cost-shared activities for understanding how best to ensure a water-secure future. Given its mission, the USGS is ideally positioned to use and develop the best science and technology-based tools to evaluate water supply solutions and continue helping water managers to establish adaptive-management strategies that address water sustainability and to partner with cultural stewards to understand the importance of long-term water security needs.

This concludes my statement, and I would be happy to answer any questions you have at the end of the panel.

[The prepared statement of Mr. Anthony follows:]

STATEMENT OF
STEPHEN S. ANTHONY
DIRECTOR, PACIFIC ISLANDS WATER SCIENCE CENTER
U.S. GEOLOGICAL SURVEY
U.S. DEPARTMENT OF THE INTERIOR
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

OCTOBER 18, 2016

Senator Hirono and Members of the Committee, thank you for your invitation to appear here today to discuss the U.S. Department of the Interior's role in integrated water-resource management and efforts to improve water security in Hawaii.

Water is essential to life and is the Nation's most widely used natural resource. In Hawaii, water resources help shape our culture, economy, and environment. As climate variability and change continue to stress limited water resources, water security will grow as a national concern. Water needs are diverse and increasingly in conflict. Integrated water-resource management will be critical to support healthy, thriving environments and societies.

Water availability is governed by an ever-evolving, complex system of natural and human-induced processes. Water is a critical commodity for human consumption, agriculture, energy, and industry; it is a fundamental requirement for ecosystem health, biodiversity, and resilience; and it has important cultural and aesthetic values.

The Department, through the U.S. Geological Survey (USGS), National Park Service, Pacific Islands Climate Science Center, and the Pacific Islands Climate Change Cooperative, is actively working to bring people together and form partnerships to ensure a sustainable and secure water future. Through this process, the Department has formed partnerships with cultural stewards to help scientists understand the importance of culturally sensitive water resources; academic researchers to develop climate change projections needed to understand potential impacts to water resources in the future; and watershed managers and State and Local agencies to understand how management activities can impact water resources.

As part of this effort, the USGS provides objective knowledge of the Nation's water resources to support human well-being, healthy ecosystems, economic prosperity, and anticipate and help resolve impending water-resource conflicts and emergencies. The bureau accomplishes this through integrated activities and partnerships with Federal, State, and local agencies and private organizations.

The USGS also serves society through water-resource monitoring, assessment, modeling, and research to provide tools that managers and policymakers can use for preserving the quality and quantity of water resources; balancing competing uses of water; understanding, predicting, and mitigating water related hazards such as floods and droughts, as well as understanding the effects of climate variability on water resources; and quantifying the vulnerability of human populations and ecosystems to water shortages and surpluses and degradation of water quality.

In Hawaii, the USGS is working in cooperation with the Hawaii Commission on Water Resource Management and other State and local agencies to expand and enhance monitoring of groundwater, streamflow, and water quality; assess groundwater recharge and availability; estimate low-flow conditions in streams needed to establish instream flow standards; quantify the impacts of high-priority non-native and dominant native plant species on freshwater availability and assess water quality related to land-use

activities. Most of these programs include an assessment of impacts of climate variability and change. In Fiscal Year 2016, the USGS contributed about $1.1 million in cooperative matching funds to these programs.

The SECURE Water Act (P.L. 111-11) authorizes the National Water Census to be implemented through DOI's WaterSMART initiative. Through the National Water Census, the USGS is taking an integrated approach to research water availability and use by bringing together diverse avenues of hydrologic and ecological research.

Work conducted under the Water Census builds our national capacity to scientifically identify, assess, and analyze water availability. The Water Census is built around the concept of understanding and quantifying water budgets. Similar to financial budgets, water budgets give us the ability to look at each component of the water cycle and understand how water moves from one component to another. Knowing how much of a resource is flowing into or out of an account allows us to anticipate developing stresses and provide information needed to manage limited water resources.

The Water Census includes new and improved methods of accounting for human factors, such as water use, and environmental and ecological criteria that can affect water management decisions. It is designed to build decision-support capacity for water-management agencies and other natural-resource managers. The National Water Census is publically available on USGS's website (http://water.usgs.gov/watercensus/).

In Hawaii, USGS is developing information and tools to evaluate groundwater availability on several of the main islands as part of a regional study of the Nation's principal aquifers. With respect to water use, USGS compiles and estimates water-use information every 5 years in cooperation with State, Federal, and local agencies. The USGS also is providing a funding opportunity to the State to enhance the understanding of surface water use in Hawaii. Finally, the USGS maintains a network of wells to monitor the effects of droughts and other climate variability on groundwater levels.

The Hawaii Fresh Water Initiative was launched in 2013 to bring multiple, diverse parties together to develop a forward-thinking and consensus-based strategy to increase water security in Hawaii. Organized by the independent nonprofit Hawaii Community Foundation, the Initiative relied on a blue ribbon advisory panel of experts including farmers, landowners, scientists, conservationists, and government officials.

The USGS served as a non-voting technical liaison on this panel, providing information and data in support of the Initiative. The panel developed a "Blueprint for Action" that provides policy and decision-makers in Hawaii with a set of solutions that have broad, multi-sector support that will put the State on a path toward greater water security. These solutions focus on improving efficiency in how water is transported and used; capturing more rainwater in our aquifers by expanding and actively protecting watershed areas while improving storm-water retention; and increasing the amount of reclaimed wastewater being reused to irrigate parks and local crops. This initiative demonstrates the benefits of government officials collaborating with and supporting communities as they address long-term water security needs.

DOI will continue to partner with the public and private sectors in Hawaii to support the understanding of watershed-management activities that affect water security and to develop cost-shared activities for understanding how best to ensure a water-secure future. Given its mission, the USGS is ideally positioned to use and develop the best science- and technology-based tools to evaluate water-supply solutions and continue helping water managers to establish adaptive-management strategies that address

water sustainability and to partner with cultural stewards to address the importance of long-term water-security needs.

This concludes my statement. I am happy to answer any questions you may have.

Senator HIRONO. Thank you.
Mr. Moore.

STATEMENT OF RANDY MOORE, REGIONAL FORESTER, PACIFIC SOUTHWEST REGION, FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. MOORE. Senator Hirono, thank you and the Committee for holding this important hearing and inviting me to testify on behalf of the USDA and the Forest Service regarding our partnership efforts to maintain and improve watershed conditions and the security of our water supply in Hawaii and across the United States.

My name is Randy Moore, and I am the Regional Forester for the Pacific Southwest Region of the U.S. Forest Service.

The history of the Forest Service and the National Forest actually began with the specific mandate to protect forested lands and to secure favorable conditions for water flow. Today, we are furthering that tradition with employees working across research and development, state and private forestry and a National Forest System in support of a healthy forest and grasslands across ownership boundaries and jurisdictions.

We recognize that our world is increasingly complex and constantly changing. We could not be successful today without the efforts of our many partners at the State, Federal and local levels working side-by-side with us. Our work is vital to securing clean, abundant supplies for water for human use, for recreation, for agriculture purposes and to support fish and wildlife populations and energy production. This is especially true in the context of a changing climate.

My submitted testimony highlights several examples of our efforts in Hawaii and across the Western Pacific Islands. I would like to use this opportunity to describe just a few of the successful, national efforts on the way that are pieces of the whole effort of the Forest Service in securing our nation's water future.

Collaborative efforts such as our partnership with Coca-Cola are making a big difference on the ground. Since 2013 we have worked on 13 projects in six national forests across the country that have engaged hundreds of volunteers contributing nearly 5,000 hours while increasing the water capacity of thousands of acres of land. Coca-Cola, National Fish and Wildlife Foundation, and others have invested more than $2.1 million to date which has been matched by partners, including the National Forest Foundation, for a total investment of $4.5 million.

Restoration work accomplished through this partnership return more than a billion liters of water to the National Forest System which is the source of drinking water for more than 60 million Americans.

Working with the National Forest Foundation projects such as the Hayman post fire restoration work in Colorado brought together more than 20 partners to leverage more than $3.3 million to restore severely burned areas and watersheds that serve as municipal water supplies to Colorado and along the front range communities. Solutions were developed collaboratively and implemented using a mixture of volunteers, contractors and agency re-

sources to restore streams, reduce sedimentation, control invasive species and improve vegetation.

In Northern Arizona the Forest Service partnered with the National Forest Foundation, the Salt River Project and other stakeholders in the Northern Arizona Forest Fund which focuses on streams and wetland restoration, sediment and erosion management.

In California, the Pacific Southwest Region signed the first massive stewardship agreement between the Forest Service and Joint Powers Watershed Authority comprised of six water agencies in three counties, the Upper Makelumne Watershed Authority. The goal of this partnership is to enhance water supplies and protect water quality and the environment both in the Upper Makelumne River Watershed as well as downstream.

Another successful partnership has been forged between the U.S. Forest Service and the California Natural Resources Agency. In 2015 we entered into a MOU to work in partnership to implement the Sierra Nevada Watershed Improvement Program which is called the WIP. The WIP is a coordinated, integrated, collaborative program to restore the health of California's primary Sierra Nevada watersheds to increase investments and needed policy changes. The activities undertaken by WIP benefits wildfire management, mitigation investment, restoration efforts, water and air quality, carbon storage, fish and wildlife and community resilience.

Beyond these specific projects the National Forest System has undertaken an evaluation of watersheds using a watershed condition framework. This provides a tool for each forest and district to assess threats and deteriorated conditions and to prioritize work to ensure a strategic, targeted approach to improving watershed health.

Water is perhaps the most fundamental of natural resources, and engaging youth and conservation stewardship in promoting healthy, active lifestyles is critical to the future management and the health of our nation's water supplies. The Forest Service, with other government agencies and partners at every level of the public and private sector, is dedicated to a continuing conservation legacy in an effort to secure our water future.

Well Senator, that concludes my statement and I would be happy to answer any questions you might have at the end of the panel.

[The prepared statement of Mr. Moore follows:]

TESTIMONY OF
RANDY MOORE
REGIONAL FORESTER, PACIFIC SOUTHWEST REGION, USDA FOREST SERVICE
Before
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
Regarding
OPPORTUNITIES FOR FEDERAL AND NON-FEDERAL PARTNERSHIPS IN INTEGRATED WATER MANAGEMENT AND EFFORTS TO IMPROVE WATER SECURITY IN HAWAII
October 18, 2016

Thank you for hosting this important hearing to examine the critical nexus between partnerships, watershed management, and water security. It is my privilege to represent the United States Department of Agriculture (USDA) Forest Service in describing the efforts across our agency to address the health and sustainability of our critical natural resources in partnership with local, county, state, and tribal governments, and other federal agencies in Hawaii and across the nation. My testimony will focus on key activities in specific programs in Hawaii that address forest and watershed health which contribute to the security of our water supply, and will also touch on programs of national scope, including several important programs within the Natural Resources Conservation Service (NRCS) at USDA.

Background

The Forest Service is organized into deputy areas, with cooperating roles in partnerships, water management and water security among other mission elements. Below is a brief overview of National Forest System, State and Private Forestry, and Research and Development deputy areas, as well as a note on the impact of the rising cost of wildfire on our mission.

National Forest System

The national forests were originally created to secure favorable water flows and provide a sustainable supply of goods and services. The National Forest System comprises 154 national forests and 20 national grasslands located in 44 States, Puerto Rico, and the Virgin Islands, encompassing about 193 million acres. Forested watersheds reduce storm runoff, stabilize streambanks, shade surface water, cycle nutrients, and filter pollutants. National Forest operations include: administering and managing recreation and heritage areas; preserving wilderness; restoring, conserving and enhancing fish and wildlife habitats; managing and utilizing forest, rangeland, mineral, and water resources in a sustainable manner.

State and Private Forestry
State and Private Forestry programs provide technical and financial assistance to help landowners and resource managers sustain the Nation's urban and rural forests and to protect communities and the environment from wildland fires, insects, disease, and invasive plants. State and Private Forestry program areas include Fire and Aviation Management, Forest Health Protection, Cooperative Forestry, Conservation Education, and Tribal Government Relations. These programs work collaboratively with local, county, state, and tribal governments and other federal agencies to enhance and maintain forests across watersheds and ecosystems, both on private and public lands.

Forest Service Research and Development
Research and Development provides long term research, scientific knowledge, and tools that can be used to manage, restore, and conserve forests and rangelands. As the world's largest forestry research organization, we employ approximately 500 scientists and have a presence in every state in America. Forest Service Research and Development carries out programs in Forest Inventory & Analysis, the National Forest Products Laboratory, comprehensive regional assessments, national and international programs, and a fully integrated science, development, and implementation program.

Continuing Erosion of Budget Capacity Due to Fire
The single most important step Congress can take to advance forest health and resilience is to enact a comprehensive fire budget solution—one that addresses both the growth of fire programs as a percent of the agency's budget and the compounding annual problem of transferring funds from non-fire programs to cover the cost of fire suppression. In 1995, fire made up 16 percent of the Forest Service's annual appropriated budget—this year, more than 50 percent of the Forest Service's annual budget will be dedicated to wildfire. Along with this shift in resources, there has also been a corresponding shift in staff, with a 39 percent reduction in all non-fire personnel since 1995.

As more and more of the agency's resources are spent each year to provide the necessary resources for fire suppression, fewer and fewer funds and resources are available to support other agency work. The dependence on non-fire programs to pay for the ever-increasing costs of fire has real implications, not only for the Forest Service's restoration work that would help prevent catastrophic fires, but also for the protection of watersheds and cultural resources, upkeep of programs and infrastructure that support thousands of recreation jobs and billions of dollars of economic growth in rural communities, and support for the range of multiple uses, benefits and ecosystem services, as well as research, technical assistance, and other programs that deliver value to the American public. In fact, since 1995, appropriations for the National Forest System have been reduced from 58 percent of the budget, to 29 percent in 2015.

USDA appreciates the continued interest from members of the Committee to address the way fire suppression is funded, and looks forward to working with members to find a solution to this problem that is continuing to negatively impact the ability of the Forest Service to complete non-fire work.

Introduction

Water is vitally important for many reasons, including resource stewardship, domestic use, and public recreation. Today, water from national forests and grasslands contributes to the economic and ecological vitality of rural and urban communities across the nation, and those lands supply more than 60 million Americans with clean drinking water.[1] National forests in the arid continental West typically occupy the very top of critical watersheds, where water is stored in winter snow packs and underground aquifers and slowly released through the spring and into the summer. National forests in the east also occupy critical watersheds, preserving water quality for downstream users and moderating floods to protect downstream landowners. Communities, farmers and ranchers, Native American Tribes, and the general public depend on delivery of clean water from the national forests and grasslands.

The contributions to and the benefits derived from forests do not end at the western edge of the continental United States. Rather, they span the Pacific and include over 1.7 million acres of forests in The State of Hawaii, the Territory of Guam, the Territory of American Samoa, the Commonwealth of the Northern Mariana Islands, the Republic of Marshall Islands, the Federated States of Micronesia, and the Republic of Palau. These diverse native forest ecosystems support a rich array of flora and fauna found nowhere else in the world. Island forests replenish important fresh water aquifers and river systems, protect reefs, and shelter and protect shorelines and coastal communities from the impacts of hurricanes, storm surges, tsunamis and floods. Traditional cultures depend directly on ecosystem services provided by forests including food, fiber, and clean water for their subsistence lifestyles. In the Hawai'ian Islands and the Western Pacific Islands, forests capture rain that becomes drinking water for island inhabitants. For example a recent study found that deforestation of the Ko'olau Mountains there would result in a loss to aquifers of $4.6 to $8.5 billion.[2]

The Hawai'ian Islands and Western Pacific Islands have relatively small land masses subject to high land use and development pressure, and are highly susceptible to disturbances such as invasive species, human-caused fires, storms, and changing climate patterns. As population and development pressures continue to

[1] http://www.fs.fed.us/publications/policy-analysis/water.pdf.
[2] "Environmental Evaluation and the Hawaiian Economy", University of Hawai'i Economic Research Organization, Jim Roumasset

grow, ecological restoration of tropical forests has clear and compelling environmental and public benefits. Sustainability of tropical forests is integral to maintaining resilient communities, diversifying local economies, and mediating the impacts of ever-increasing tourism industries. The economies of the Hawai'ian Islands are directly tied to the health and status of their forests.

The Forest Service supports a variety of collaborative work to restore, enhance and protect forest resources among the Pacific Islands. Congressionally appropriated funds are matched with Pacific Island partner funds to improve and maintain the health of urban and native forests, conserve native working forests through conservation easements, support development of tropical forestry management tools, and increase technical capacity of local forestry and natural resource personnel. The Forest Service continues to support local island professionals which is essential for fostering participation in collaborative efforts, increasing the number of restored acres, integrating cultural knowledge and agroforestry practices into conservation practices, and raising awareness at the community level about the increasing threats to island forests.

Partnerships in Forest and Watershed Management and Environmental Education

Partnerships are essential to carrying out this mission. They allow us to leverage our resources while providing wise management of our nation's water resources, engaging youth in conservation stewardship, and promoting healthy, active lifestyles. The U.S. Forest Service's partnership program is valued at nearly $1.3 billion— in FY 2015 the agency executed over 21,000 grants and partnership agreements. Examples of important partnerships in California and Hawai'i include:

The U.S. Forest Service and the California Natural Resource Agency entered into a Memorandum of Understanding (MOU) in August 2015 to work in partnership to implement the Sierra Nevada Watershed Improvement Program (WIP). The WIP is a coordinated, integrated, collaborative program to restore the health of California's primary Sierra Nevada watershed through increased investment and needed policy changes. The activities undertaken by the WIP benefit wildfire management, mitigation investments, restoration efforts, water and air quality, carbon storage, fish and wildlife, and community resilience.

The Forest Service Forest Stewardship Program (FSP) operates in partnership with California, Hawaii, and six US-affiliated Pacific Island jurisdictions to promote sustainable management by private landowners (family forests) as well as state forested lands. A primary focus of the program, especially in California and Hawaii, is the development of individual FSP Plans that provide landowners with the information they need to manage their forests for a variety of products and services, including freshwater conservation.

The Hawaii Forest Stewardship Program received over $155,000 from the Forest Service for FY 2015-2016 with an equal state match to provide technical and financial assistance to non-industrial private landowners and to conduct conservation education activities.

In FY 2014 through FY2016 funds of more than $148,000 (with an equal match) were provided to restore Hawaii state tree nurseries and create seed banks for restoration projects especially on watersheds affected by fire and disease. Over 85,400 tree seedlings have been produced as well as a comprehensive report and recommendations for state nursery programs is nearly complete.

As healthy forests are critical for clean, abundant water, the Forest Service supports the Hawaii Division of Forestry and Wildlife (DOFAW) Urban and Community Forestry through technical, financial, and educational assistance. In FY 2014 through FY2016 over $830,000 was granted with more than $850,000 provided in matching funds. This assistance encourages cooperative efforts to plan urban forestry programs and to plant, protect, maintain, and utilize wood from trees in open spaces, greenbelts, roadside screens, parks, woodlands, curb areas, and residential developments in urban areas. By leveraging US Forest Service resources, DOFAW supports the development of community level forest management plans, the critical training of professional forestry staff, the adoption of ordinances or policies for urban forest management, and the growth of local tree boards and planting organizations.

The nonprofit Friends of Hawaii's Urban Forest, in partnership with the Forest Service, is completing a project to improve water quality using a FY 2013 $100,000 grant with an equal match provided. They are also conducting an urban tree canopy assessment for the island of Oahu (FY2015 funds over $78,000) to inform city planning and larger climate change resiliency initiatives.

The Forest Service also supports the Pacific Rim Resiliency Program through a Hawai'ian nonprofit called Kupu. In FY 2016 $20,000 was granted with an equal match provided. This program places youth and young adults from the community into partner organizations to help build capacity for climate resiliency projects, covering environmental stewardship and education.

Joint Chief's Project in Hawaii

In FY 2015, NRCS and the U.S. Forest Service invested $37 million in 28 projects across 25 States through the Chiefs' Joint Landscape Restoration Partnership to help mitigate wildfire threats to communities and landowners, protect water quality, and supply and improve wildlife habitat for at-risk

species. This multi-year partnership between NRCS and the U.S. Forest Service is working to improve the health and resiliency of forest ecosystems where public and private lands meet across the nation.

In Hawaii, the USDA NRCS and Ko'olau Mountains Watershed Partnership have teamed up in the Ko'olau Mountains, Oahu, to remove invasive plants and animals from the Poamoho and Kaluanui areas of the Ko'olau Mountains that feed the Pearl Harbor aquifer. This project will improve ground water recharge as well as improve habitat quality for at-risk native species. All activities funded with Forest Service funds are on state lands. In FY 2015 and FY 2016, the Forest Service granted $60,500, with a $60,500 match; NRCS made a $208,500 one-time grant to this project.

The Threat of Invasive Species to Watershed Condition and Ecosystem Functionality

Invasive species cause billions of dollars in damage each year in the United States. Aquatic and terrestrial invasive plants, pathogens, vertebrates, invertebrates, algae, and fungi are degrading watershed condition and ecosystem functionality, reducing forest and rangeland productivity, increasing the risk of wildfire and soil erosion, causing declines in recreational use and enjoyment, negatively impacting human health and safety, endangering livestock, and threatening native fish and wildlife populations and their associated habitats, causing declines in property values, and undermining the economy at all levels.

The Forest Service continues to play an important national and international leadership role in advancing the understanding of the invasive species problem. The wide ranging authorities of the Forest Service allow us to work with federal, state, county, Tribal, and private partners to combat invasive species across all lands, public and private. We also develop methods, tools, and approaches, through which these harmful exotic species can be detected, prevented, controlled, and eradicated.

The invasion of non-native organisms into the Hawai'ian Islands over the past two and a half centuries has reached a magnitude that now threatens to devastate native ecosystems and depress sectors of the state's economy. The severity of the situation has become clearer over the past decade. Hawai'i is plagued with pest invasions to a greater extent than almost any other location in the world. In response to these invasions, a number of innovative partnerships have been developed to combat invasive species such as rapid 'ōhi'a death, coconut rhinoceros beetle, and several others.

Rapid ' Ōhi'a Death (ROD)

Stands of Hawai'i's keystone endemic tree, 'ōhi'a lehua, are experiencing alarming levels of mortality, more than 90 percent in some cases, across large areas of Hawai'i Island. ' Ōhi'a accounts for 50 percent of all trees, native or non-native, and 50 percent of the total area of Hawai'i Island. ' Ōhi'a makes up 80 to 90 percent of the trees across all of state's native forests. Rapid 'ōhi'a Death (ROD) is a plant disease that

has killed millions of mature ʻōhiʻa trees on Hawaiʻi Island during the last several years, and is a high priority issue for all natural resource and agricultural agencies working in the state of Hawaii. The top priority is to continue to provide research and technology development that effectively informs management actions.

Multiple efforts are underway to address this high priority issue in Hawaii. For calendar year 2016 $850,000 was dedicated for these efforts (40% private, 40% state, 20% federal). For FY 17, the State has appropriated $300,000 for ROD research conducted by USDA Agriculture Research Service; the Forest Service will also provide funds.

Other Diseases, Invasive Plants, Invasive Insects

USDA Forest Service Forest Health Protection (FHP) provides technical assistance, conducts surveys, and offers financial support to National Forests, other federal agencies, universities, Tribes, non-governmental organizations (NGOs) and state & private landholders to prevent or manage native and invasive insects, diseases, and plants. FHP responds to emerging pest issues, works across state borders and the Pacific islands, collaborates with regulatory and land management agencies, and works at national, regional, and local levels to restore forest ecosystems to prevent unacceptable levels of tree mortality caused by insects and diseases and to lower the negative impacts associated with invasive plants.

The Forest Service provides funding to support invasive plant, insect and disease work in Hawaii through a grant with the Hawaii Department of Land & Natural Resources. The FY16 grant was $450,000 with an equal match; FY15 was $665,000 with an equal match. Funding is provided to support insect and disease pest detection and management; invasive plant survey and control; development of disease resistant koa; the Coordinating Group of Alien Pest Species; and conduct outreach and conservation education. USDA APHIS continues to support eradication of coconut rhinoceros beetle on the island of Oahu with Farm Bill funding, in cooperation with the Hawai'i Department of Agriculture and other partners.

Landscape Scale Restoration Projects

The Forest Service Landscape Scale Restoration (LSR) program provides a means to focus on priority areas, challenges and opportunities identified by states' Forest Action Plans. All western states and islands compete for funding through a process managed by the Western Forest Leadership Coalition (WFLC). Recent grants include:

Conserving Kauai Hardwoods

This project collects and banks the seeds of three endemic tree species (koa, ʻōhiʻa, and koaia) from stands on the island of Kauai, with the intent to expand this program to all of the Hawai'ian Islands. The goal is to create a reliable supply of native hardwood seed and seedlings to mitigate large-scale mortality events on Kauai, such as wildfires. In addition, the emergence of ROD has provided a stark reminder of the critical need for ʻōhiʻa seedbanks. Partners include: DOFAW, University of Hawaii, Hawaii Ag Research Center, Kaulunani UCF Program, USDA NRCS. In FY15 $75,000 was granted, with $75,000 in matching funds.

Koa Seed Orchard

This program will locate Fusarium wilt-resistant koa trees and collect seed from resistant trees. It will also expand and support a network of seed orchards to produce disease-resistant koa seeds, and provide cooperative extension information for landowners on using disease resistant koa. In FY 2014 $150,000 was granted with a $150,000 match.

Pacific Islands Research and Technological Assistance

An integral component of the Forest Service's mission in the Pacific is the Institute of Pacific Islands Forestry (IPIF), a field unit of the Pacific Southwest Research Station established in 1967. The Institute provides scientific and technical information needed to restore, conserve, and sustain Pacific tropical forests and wetlands through an integrated and collaborative program of research and science delivery to coordinate and collaborate among all local, state, and federal partners. While IPIF's research and technological assistance focus is Hawaii and the Western Pacific islands, its findings are applicable to many tropical and temperate ecosystems of the world, including the U.S. mainland.

Four key collaborative research and technological assistance efforts are ongoing to specifically address:

Water and Watersheds Vulnerabilities

Climate change, land use and associated degradation, and invasive species are among the growing threats to water resources in the Pacific. Demand on water resources is predicted to increase with population growth, as native ecosystems are replaced by fast growing, water demanding invasive plants, and as temperatures warm further in the future. This situation will be exacerbated where rainfall amounts decline or where total rainfall is distributed over fewer but larger rain events, with larger intervening dry periods and droughts. IPIF research is providing important information for predicting future conditions within the Pacific, which is needed to aid in watershed management strategies for state and other land owners and managers for the future.

Climate Change Vulnerabilities

Climate change is expected to influence watershed function and native species habitat in tropical island streams, yet few model systems exist to study how these aquatic ecosystems will respond to forecasted changes. Tropical island watersheds are also threatened by invasive plants that use more water and alter stand and stream hydrology; changing climate is anticipated to exacerbate these parallel threats. Results from IPIF research is being used to develop decision support tools to aid in the conservation or restoration of Pacific island watersheds, steams, and water resources vital for sustaining communities and ecosystems.

Fire Vulnerabilities

Wildfire is a frequent disturbance in Hawaii with more than one percent of the state burning annually. This percentage is greater than that burned in the fire-prone western U.S., such as California. A 108-year history shows a more-than-fourfold increase in acreage burned annually statewide. These patterns suggest that wildfire occurrence may continue to increase across the state with expected future warming and drying. The vast majority of wildfires in Hawaii are started by humans, and are exacerbated by highly invasive grasses from Africa. If natural areas are burned they are replaced by these non-native grasses. Collaborative research in the Pacific is being conducted to better assess fire risk and its impacts at landscape scales to increase the integration of pre-fire planning and prevention into existing land management/restoration plans.

Natural Resources Science Literacy

Natural resources science literacy in the Pacific is furthered by the USFS through the work of the Hawaii Experimental Tropical Forest (HETF). The HETF consists of approximately 50,000 acres of State owned tropical wet and dry forest on Hawai'i Island, co-managed by the Division of Land and Natural Resources and the US Forest Service. The Mission of the HETF is to provide landscapes, facilities, and data/information to support research and educational activities for a better understanding of how to conserve and manage the biological diversity and functioning of tropical forest and stream ecosystems, as well as to understand the human dimensions of natural resources conservation and management.

Programs within USDA Natural Resources Conservation Service

Within USDA, the Natural Resources Conservation Service helps America's farmers, ranchers and forest landowners conserve the nation's soil, water, air and other natural resources. All programs are voluntary and offer science-based solutions that benefit both the landowner and the environment. There are critical Farm Bill tools, including some programs that were newly created in the 2014 Farm Bill, that are used together and in partnership with producers, forest landowners, and other public and private partners that are making major gains in addressing locally and regionally identified priorities.

The Regional Conservation Partnership Program (RCPP), one of these new programs, is a partner-driven, locally led conservation approach. Now in its second year, RCPP has demonstrated high demand, with over 2,000 partners leading nearly 200 projects nationwide. All told, in the first two years of the program, NRCS will have invested about $500 million while another $900 million is being brought in by partners to address locally defined, nationally significant natural resource issues.

Other NRCS programs such as the Environmental Quality Incentives Program (EQIP), Conservation Innovation Grants (a component of EQIP), and easement programs like the Agricultural Conservation Easement Program, have been successful in helping improve soil, water, plant, animal, air and related resources. Through the EQIP National Water Quality Initiative (NWQI), NRCS is offering financial and technical assistance to farmers and ranchers to improve water quality in priority watersheds with impaired streams. Nine watersheds draining to Hilo Bay on the island of Hawaii have been selected as the Pacific Island Area NWQI focus. Through USDA Farm Bill programs over $1.5 million of financial assistance has been provided to farmers and ranchers to apply conservation practices. Nutrient management systems, erosion control, conservation tillage, and grazing management are just some of the practices being offered through the NWQI.

Conclusion

Forested watersheds, both public and private, are essential to sustaining the Nation's freshwater supply, with more than half of this supply originating on forested lands. The Forest Service and USDA will continue to lead cooperative efforts to maintain and improve watershed health and water security for the citizens of Hawaii and for all Americans.

This concludes my testimony. I want to thank the committee for its interest, leadership, and commitment to our shared natural resources. I would be pleased to answer any questions you may have.

Senator HIRONO. Thank you very much.

I love the way that you all stay within the five-minutes. [Laughter.]

You must have done this before.

Alright, Mr. Smith.

STATEMENT OF DAVID SMITH, ADMINISTRATOR, DIVISION OF FORESTRY AND WILDLIFE, DEPARTMENT OF LAND AND NATURAL RESOURCES, STATE OF HAWAII

Mr. SMITH. I will see if I can stay to that. [Laughter.]

I am David Smith, Administrator with the Division of Forestry and Wildlife, and I appreciate this opportunity to examine opportunities for Federal and non-Federal partnerships in integrated water management and efforts to improve water security in Hawaii.

In the late 1800s, vast areas of Hawaiian forests were cleared by grazing, unregulated logging and fires. As forests disappeared, our water supply was threatened and streams and springs began to dry up across the state. In 1903, Hawaii established the first state forestry division in the nation, spurred by the recognition of the important connection between forests and water security.

In the early 1900s, our agency undertook an ambitious effort to fence a million acres of forested watershed, remove introduced grazing animals, control wildfires and plant trees to restore deforested areas. A century later this work is no less relevant, and the State of Hawaii continues to prioritize watershed protection through the Governor's Sustainable Hawaii Initiative.

With the recognition that 66 percent of Hawaii's forests are in private hands, we worked cooperatively with our Federal and private partners to establish the Watershed Partnership Program in 1991, an innovative voluntary partnership of forest landowners, organizations and agencies dedicated to the protection of forested watersheds. This groundbreaking model has been very successful in Hawaii allowing landowners to work across ownership boundaries to cooperatively manage watersheds.

A number of federal agencies assist with watershed protection, research, and management actions in Hawaii. They assist the state with the landscape scale protection, watershed protection, management of ecosystems and native species and forest management on state and private lands.

The U.S. Geological Survey's Pacific Islands Water Science Center has been conducting important research that quantifies how our forests protect our water supply and how forest degradation can dramatically decrease water availability. Research by the Biological Resources Division informs our management of wildlife and plant populations throughout the state.

National parks and national wildlife refuges protect some of Hawaii's most impacted native forests. The Department of Defense and the U.S. Fish and Wildlife Service's Endangered Species Programs are central to restoring populations of birds, plants and invertebrates that are part of an interdependent network essential to overall forest ecosystem health.

The U.S. Department of Agriculture, through its U.S. Forest Service, Natural Resources Conservation Service and Farm Service agency provides technical and funding support for Hawaii's water-

shed projects. In particular, the USDA competitive grants programs, offered through the landscape scale restoration, forest legacy, joint chiefs restoration and regional conservation partnership programs, directly contribute to forest management that enhances water quality and quantity in Hawaii. These competitive programs, in addition to the U.S. Forest Service and NRCS base programs, have expanded important work in upland forests and are critical for water security.

With the growing threats to the nation's forests there is a need to increase the scale of proactive management; however, wildfire suppression costs are consuming the U.S. Forest Service's funding for preventative management to restore forest health and resilience, protect clean water supplies and support climate change adaptation strategies. There is a clear need to have separate fire and emergency response funding for wildfire suppression to maintain the Forest Service restoration management programs that promote proactive management of the nation's forests and will ultimately result in healthier, more resilient landscapes.

Measures such as the proposed Wildfire Budgeting Response and Forest Management Act, the Recovery in America's Wildlife Act and the existing Healthy Forest Restoration Act can all help to promote sustainable forest management. Further, management of these diverse forest threats require up to date research as provided through programs such as the U.S. Forest Service's Institute of Pacific Islands Forestry. They provide expertise in critical natural resource management needs for us here in Hawaii.

Hawaii is faced with other urgent forest health concerns. The Governor talked about Rapid Ohia Death and the leadership from federal agencies such as the Forest Service, Agriculture Research Service, the USGS and the National Park Service have helped to provide research and guidance helping us to characterize and contain this disease.

Federal agencies have also provided expertise to support the state's development of new mechanisms for watershed protection through programs that promise to provide financial incentives through private sector partnerships such as payments or credits for ecosystem services and carbon sequestration.

Hawaii was an early leader in watershed protection and continues to engage on a national scale. Federal agencies add to the efforts of our local agencies and organizations and are essential to the success of our interconnected watershed partnerships.

Thank you for holding this hearing on this important issue. Hawaii has a long history of forest protection and partnerships and we hope that Federal support and collaboration will continue to expand as both the threats and the importance of these forests are magnified in the future.

[The prepared statement of Mr. Smith follows:]

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Testimony of
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Administrator
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Before the U.S. Senate Committee on
ENERGY AND NATURAL RESOURCES

Tuesday, October 18, 2016
10:00 AM
State Capitol Auditorium

TO EXAMINE OPPORTUNITIES FOR FEDERAL AND NON-FEDERAL PARTNERSHIPS IN INTEGRATED WATER MANAGEMENT AND EFFORTS TO IMPROVE WATER SECURITY IN HAWAII

In the late 1800s, vast areas of Hawaiian forests were cleared by grazing, unregulated logging, and fires. As forests disappeared, our water supply was threatened. Streams and springs began to dry up across the state. In 1903, Hawaii established the first forestry agency in the nation spurred by the recognition of the important connection between forests and water security. That initial agency has evolved into today's Hawaii Division of Forestry and Wildlife.

In the early 1900s, our agency undertook an ambitious effort to fence a million acres of forested watershed, remove introduced grazing animals, control wildfires, build trails for forest management, and plant trees to restore deforested areas. A century later this work is no less relevant, and the State of Hawaii continues to prioritize watershed protection through the Governor's Sustainable Hawaii Initiative and 30x30 watershed goal, an ambitious program to protect, restore and manage watershed forests in Hawaii.

With the recognition that 66% of Hawaii's forests are in private hands, we worked cooperatively with our federal and private partners to establish the Watershed Partnership Program in 1991, an innovative voluntary partnership of forest landowners, organizations and agencies dedicated to the protection of forested watersheds. This groundbreaking model has been very successful in Hawaii, allowing landowners to work across ownership boundaries to cooperatively manage watersheds.

A number of Federal agencies assist with watershed protection, research, and management actions in Hawaii. They assist the state with the landscape scale watershed management, protection and management of ecosystems and native plant and animal species, and assistance with forest management on state and private forest lands.

The U.S. Geological Survey's Pacific Islands Water Science Center has been conducting important research that quantifies how our forests protect our water supply, and how forest degradation can dramatically decrease water availability. Research by the Biological Resources Division informs our management of wildlife and plant populations throughout the state.

The U.S. Department of Agriculture (USDA), through its U.S. Forest Service, Natural Resources Conservation Service (NRCS), and Farm Service Agency, provides technical and annual funding support for Hawaii watershed projects. In particular, the USDA competitive grant programs offered through the Landscape Scale Restoration, Forest Legacy, Joint Chiefs Restoration, and Regional Conservation Partnerships programs have directly contributed to forest management that enhances water quality and quantity in Hawaii. These competitive programs, in addition to U.S Forest Service and NRCS base programs, have expanded important work in upland forests that are critical for water security.

However, with the growing threats to Hawaii's and the nation's forests from invasive plants, insects, diseases, and wildfire there is a need to increase the scale of proactive management. Wildfire suppression, in particular, is consuming the Forest Service funding for preventive management that would increase forest resilience and health, sustainability, clean water, and support climate change adaptation strategies - all of which also support forest management in Hawaii. There is a clear need to have separate fire and emergency response funding for wildfire suppression; restore the Forest Service restoration and management programs; and promote proactive management of the nation's forests through measures such as the proposed Wildfire Budgeting, Response, and Forest Management Act. Further, management of these diverse forest threats require up-to-date research as provided through the U.S. Forest Service Institute of Pacific Islands Forestry that provides expertise in critical natural resource management needs.

Our other Federal partners that provide support for watershed protection are the U.S. Department of Interior National Park Service and U.S. Fish and Wildlife Service and National Wildlife Refuges, which protect some of Hawaii's most intact native forests. The Department of Defense also partners to protect populations of listed species, and the U.S. Fish and Wildlife Services' endangered species programs are central to restoring populations of birds, plants, and invertebrates. These listed species are part of an interdependent network essential to overall forest ecosystem health.

Hawaii is faced with other urgent forest health concerns, the most critical of which at present is the fungal disease commonly known as Rapid 'Ōhi'a Death. Leadership and

assistance by the Forest Service, Agriculture Research Service, the US Geological Survey, and the National Park Service has helped to provide research and guidance on this disease that is killing our most abundant native tree which is the keystone species in the Hawaiian native forest. These agencies have provided funding, research expertise, logistical support, and coordination toward understanding, mapping, and controlling this threatening disease.

While Hawaii is dealing with this urgent local problem, we are also working on providing a solution to global issues, specifically by sequestering carbon through reforestation. Federal agencies have provided research and expertise to support the State's development of new mechanisms of watershed protection through programs that promise to provide financial incentives through private sector partnerships, such as payments or credits for ecosystem services for improved water quality benefits, and carbon sequestration.

Hawaii has been an early leader in watershed protection, and continues to engage on a national scale. Federal agencies add to the efforts of our local agencies and organizations, and are essential for the success of our interconnected watershed partnerships. Thank you for holding this hearing on this important issue. Hawaii has a long history of forest protection and partnerships, and we hope that Federal support and collaboration will continue to expand as both the threats and the importance of these forests are magnified in the future.

Senator HIRONO. Thank you very much to all of our panelists.

I have some questions for each of you as well as for the panel at large, if we can get to those.

Mr. Smith, given the Governor's recent announcement for the state to pursue the goal of protecting 30 percent of priority watersheds by 2030 and right now we are protecting, as he said, some 15 percent, it is clear that watershed protection and water security are priorities for our state.

Can you speak more to how high of a priority these are for the state and how does this compare to the importance and prioritization these are afforded by the state ten or 20 years ago? And how do you think that these will be ranked 20 years from now? It is a series of questions. Along those lines, what needs to happen for the state to achieve its goal of protecting 30 percent of priority watersheds by 2030? And are there clear ways in which the federal agencies can contribute to helping the state reach this goal?

Mr. SMITH. Yes, there is currently a real strong push from the state government to protect forested watershed. This is a continuation, I mean, the baseline for our agency is watershed protection, so this has been a tradition in our agency since its inception, you know. It is over 100 years worth of protection. Just recently there has been a very strong push.

Senator HIRONO. Yes.

Mr. SMITH. From the recent administrations to protect native forested watershed. And you know, we expect that to continue on to the future. Our legislative leaders recognize the need, and the Governor is certainly strongly committed to it. And so, with continued support, funding support at the state level, we should be able to reach our goals.

It is definitely an ambitious program and we are looking for legislative support. But we have been getting it and it is, along with leveraging through partnerships, you know, that is really one of the really keys here is to be able to leverage those partnerships.

You are going to hear from stakeholders in a little while. They are the folks that we work with out on the ground to get some of this work done.

The Federal agencies are key, you know, for things like Rapid Ohia Death and a lot of our forest management programs, you know, the U.S. Forest Service is a key agency.

I think one real important thing is this fire borrowing. We need to fix that because that is taking money away from a lot of these sustainability programs.

Senator HIRONO. Yes.

Mr. SMITH. And so, something needs to be done to make sure that we are able to put water into sustainability in forest health and resilience of the forest so they can adapt to some of the fire threats, especially in the Western United States. But even though it is the Western United States, fire problems affect us because the fire borrowing takes from the Forest Service and then employees are affected by having the programs that really support Hawaiian watershed forests.

Senator HIRONO. I am sure you are aware, or maybe you are not, but you certainly are Mr. Moore, that the Energy Committee in the

Senate has had a number of sessions regarding the fire borrowing and what that is doing to the budget.

For the Forest Service, while our Committee is well aware of the extent of fire issues all across our country, of which, by the way, Hawaii is on par in terms of the percent of acreage that burns. Of that, our Committee is very aware. We just have to get everybody else to understand that this continual fire borrowing is very detrimental. Of course we will continue to push for all of that.

Do you feel that in the State of Hawaii with everything that is happening with Rapid Ohia Death, climate change, etcetera, that you are seeing a sense of urgency?

You did say that we have been doing these kinds of programs for a hundred years, but do you feel more of a sense of urgency now with everything that is happening and what we need to do in Hawaii?

Mr. SMITH. Absolutely, and we've really stepped up the efforts in the last several years. The legislature and the, you know, at the Governor's request and legislative support has provided millions of dollars that was not previously allocated for watershed protection and management.

And so, there certainly is a sense of urgency. People are starting to understand and seeing the effects of climate change and what not, and we're going to feel that very strongly here in Hawaii because we are out in the middle of the Pacific, all our water comes from rain. The Hawaiians said that the rain follows the forest and they understood, very clearly, that forest and water is interrelated.

Senator HIRONO. I think that our panelists from the Federal Government, you are very well aware that Hawaii is very uniquely situated and that we get so much of the water that we need from our aquifers and rain, as opposed to rivers and dams. We do not have those in Hawaii, so the partnership with the Federal Government becomes even more important, the various programs that we have.

I am glad that the Governor mentioned Rapid Ohia Death because to the extent that is covering, I believe he said, some 50,000 acres, and we have not figured out how to stem this Rapid Ohia Death issue in our forested areas.

Mr. SMITH. Yes, it's really a scary issue. Ohia is the keystone species for the Hawaiian forest. Losing it would be devastating. So those types of issues help to underlie, you know, the level of urgency on these.

Senator HIRONO. And in that we probably could use more help from the Federal agencies.

Mr. SMITH. Absolutely.

Senator HIRONO. Particularly, would it be the Department of Agriculture or what Federal agency do you think would be the most appropriate?

Mr. SMITH. We work primarily with Agriculture and are also working with the National Park Service because they have some big land holdings on the Big Island.

But really being able to characterize the disease, figure out how it is spreading and be able to contain it, are our focus right now and the Forest Service is going to want to remain a partner to that.

Senator HIRONO. By the way, since a large part of our blueprint for what we need to do regarding water usage is to improve our community's understanding, you are also focusing on practices of the health department, I really do not know which state department, conservation aspects, and that we need to use less water in the State of Hawaii per person.

Mr. SMITH. Yes, absolutely.

Senator HIRONO. Can you get involved in that area?

Mr. SMITH. Absolutely. It is not necessarily in our main mission on the conservation side, but we do work closely with the water resource agencies looking at how water is delivered to residential and agricultural customers and working on ways to deliver water more efficiently, that they are turning some of the old ditch systems which had a lot of leakage into pipe systems so it is more efficient.

I know Senator Gabbard, for instance, and Rep. Yamane are very keenly aware of the water conservation side of the equation.

Senator HIRONO. For Mr. Moore, I know that USDA has partnered with the Department of the Interior to pilot the Western Watershed Enhancement Partnership in six Western states and you did mention that in your testimony, I believe? That is in the continental U.S. for the purpose of reducing wildfire risk to water supplies. As you know, Hawaii is on par with Western states, as I mentioned, on percent land burned, and invasive species contribute to wildfire risk and threaten our watersheds.

Do you think this partnership should be made permanent because right now it is a pilot program? And do you see benefits to expanding the partnership to Hawaii and other Pacific Islands, and if not this specific partnership, do you see benefits and opportunities for the Forest Service or more broadly, USDA, to engage in similar partnerships in Hawaii?

Mr. MOORE. Thank you, Senator.

I certainly think that it has been very helpful in terms of engaging the greater community and to securing all water flows and water rights.

You know, one of the things that we are noticing though is that this is going to be a long-term issue and what we have done in the past which we have to improve upon is engaging our youth because this is going to be, like I said, a long-term issue and our youth need to understand the importance and the connection with these urban areas, with these rural areas that provide the water supply.

And I will give you an example in terms of how that is being affected. You know, a lot of the reservoirs supply hydroelectric which provides energy into urban populations. And when you have a wildfire and it really affects a number of things. One, the carrying capacity of the reservoir to generate that electricity. But the other piece is the burning down of utility corridors and having to reroute the energy and in some cases, do without energy.

And having these partnerships really allows the greater community to be engaged in, not only what we do, but how we go about being responsive to the water flow.

Senator HIRONO. Since this is a pilot program right now with your agency, do you think that it should be made permanent and can we have something like this in Hawaii?

Mr. MOORE. I think if it is made permanent it would be a good thing, and I certainly think it can apply to Hawaii. I think Hawaii has a unique opportunity. The area, it is almost like a little enclosed island.

Senator HIRONO. Well, it is. [Laughter.]

Mr. MOORE. But what I have noticed is that——

Senator HIRONO. Most remote land is.

Mr. MOORE. It is a family environment and that most of your, the key non-profit, special interest groups, they work together quite well as compared to some of the mainland opportunities where there's a lot of consternation and sometimes litigation because we cannot agree on things. So I think putting this in Hawaii would be a great place because you have the partnerships and your relationships there.

Senator HIRONO. Thank you. I will be wanting to work with you on how to make——

Mr. MOORE. I would be happy to.

Senator HIRONO. This happen and to come to Hawaii.

Mr. Anthony, in your testimony you mentioned the Secure Water Act and the work that USGS is doing to better understand water availability under that authority. The Act authorizes a number of programs to address water security in the West, including programs to study and improve security through a wide range of activities.

Unfortunately, Hawaii is not eligible for many of these programs because Hawaii is not a traditional Reclamation state. And as an island state that faces severe, really challenging, water issues, I believe there is a need for Hawaii to access the same kinds of federal programs and assistance that have been so important in other Western states.

What kinds of opportunities would strengthen federal engagement and support for addressing Hawaii's water security and what do you think are some of the opportunities and challenges to improving federal and non-federal partnerships to help address Hawaii's water challenges?

Mr. ANTHONY. Thank you for that question.

Yes, it is true that Hawaii is not termed a Reclamation state and if you would like more information on that and what it would take for Hawaii to become a Reclamation state I could have folks look into that and respond to the record for that.

But what we have been able to do within the Department of the Interior is we have an initiative called Water Smart, and Water Smart stands for Sustainable and Managed America's Resources for Tomorrow. This Water Smart initiative allowed some collaborative efforts with USGS and the Bureau of Reclamation, and USGS' primary role in that is a national water census. That effort is extremely important because for us to secure our water future we need to understand how much water we are using and for what aspects of our sector, whether that be the industrial, utilities for public supply or agriculture.

And our water use reporting in our nation is lacking. We, at USGS, work with states and federal agencies and local agencies to pull that information together every five years; however, that is not at a frequency that is sufficient enough to really assist decision-

makers. Also through the National Water Census we have been able to provide grant funding to states to try to improve water use reporting.

There are other aspects with the National Water Census that we are involved in related to estimating stream flow at ungauged sites or in our nation as well as assessing ground water availability and Hawaii is one of the areas where we have been doing these regional ground water availability studies, building island-wide ground water flow models for the island of Oahu, Mokelumne, sorry, Oahu, Maui, and Kauai. Those models allow us to look at the impacts of developing ground water on stream flow as well as salinity within the aquifers.

Also, as part of the National Water Census, we are looking at evaporation losses such as evapotranspiration and the role of ecology in the importance of sustaining ecological services and how the development of water resources does have consequences on our ecology and it is important to find a way to balance our needs for humans as well as ecology.

And then finally under the Water Smart activity that USGS has there are geographic focus area studies that are being undertaken and there are three currently underway within the U.S. I am hoping that we could bring one of those focus area studies to Hawaii in the future.

Senator HIRONO. I would like to work with you on a number of those issues including enabling the State of Hawaii to access all of these programs that other Western states have access to.

Now, there have been several of our witnesses who commented on a "Blueprint for Action." I do not know if the two of you have had a chance to read this, but one of the suggestions that applies to what you were just talking about is regarding the reporting. The council that put together this blueprint recommends that USGS and our Water Commission and County Water Departments develop and establish consistent methods, standards and indicators to monitor the status and trends in fresh water availability, etcetera. If all of these different agencies are not using comparable measurements, that makes it difficult for decision makers to figure out what is really going on.

So is this something that you can work with us on to develop these consistent measurements?

Mr. ANTHONY. Yes, in fact just this year in cooperation with the State Water Commission, the USGS is engaging in a cooperative effort with them to identify what our water resource monitoring needs are in our state.

Over the number of the last few decades there has been a decline in monitoring as money has gotten tight for water resource monitoring. And so, this effort is focused on trying to figure out where do we need to collect rainfall data, ground water levels, salinity data in our wells, as well as stream flow. And that effort is being undertaken, you know, again, in cooperation with the state water commission but also through that process we'll be engaging the county water departments and other stakeholders.

And one aspect of that is how do we bring together the data that's also collected by others, not just USGS and as that initiative talks about ultimately creating a shared environment where all the

data from the various agencies and others are coming together and perhaps one place for that is at the University of Hawaii as they've recently have an NSF grant called EPSCoR.

Senator HIRONO. Twenty million, I think it is.

Mr. ANTHONY. Yes. And so that is a very nice opportunity to bring together.

Senator HIRONO. Yes.

Mr. ANTHONY. The efforts of many.

Senator HIRONO. Thank you very much.

It is very clear that there are a lot of entities, private, public, federal, county, people working in all these areas and the word holistic was mentioned by the Governor and others.

This question is for the entire panel. Can you provide an example of really successful landscape-scale management, something that you mentioned, you used that term, Dave, partnership and landscape scale meaning working across boundaries and jurisdictions and taking into account the water, land, wildlife, etcetera, for a holistic management approach?

What aspects allowed the successful partnership to work and are those successes translatable to watershed management initiatives here in Hawaii? And possibly for the two of you, because you have an awareness of what is going on with these holistic approaches all across the country, is there a model that we can look at?

Mr. MOORE. Yeah.

Senator HIRONO. Mr. Moore.

Mr. MOORE. We don't have a national forest in Hawaii, so the experiences would be different. We'd be working through the state and looking at landscape but I'll give you some examples.

In California under the Farm Bill, the Good Neighbor Authority, we have been working to use a lot of different moneys coming in to look at landscapes. And the thing that we've noticed is that watersheds, it just has no boundaries and that we need to get together with federal, state, local, and special interests and look at what's best for that landscape and what's best for that land.

The Farm Bill authority, particularly under the Good Neighbor part of that, has given us the opportunity to have state money spent on federal lands and vice versa.

You can also make investments. And we're exploring opportunities now where investment bankers are looking at the ideal of investment, restoration of the landscape that they can receive some type of a profit. We haven't worked that out yet but it's these types of new ideals that are emerging, simplify taking a landscape approach and trying to bring the greater community into trying to be responsive to needs.

And so, the state, California, for example, has a cap and trade system. Some of already news that's generated from a cap and trade system, I noticed the Governor had put about $150 million into the forested sector for the 2016 budget. And whether that's going to go through or not, I don't quite know, but it's recognizing the importance of forestry and how that greater community needs to be working together.

So we're working on that now and we have examples across the U.S., Arizona, Colorado and other places where we're trying to work across boundaries so that it's irrelevant who manages those

different boundaries, and we're seeing some successes there in California.

We've estimated, I don't know if I'm giving you more than what you're asking for, but we've estimated the National Forest in California, about 55 to 60 percent of all the water runs off the national forest and it's the drinking supply for about 23 million Californians. And if you had to put a value on that water, it's about $9.5 billion per year and that also helps support about a $38 billion agriculture industry.

And so because you have most of that coming off the national forest, we're beginning to look at ways to explore and engaging a lot of other people in what we do because in the past the Federal Government, we would sit down and say here's what we think. What do you think about what we think?

And what we're finding now through collaboration and facilitating the different expertise out in that greater community is that we sit down together and we decide what we want to think about and what we want to do. And I think—so I'm very hopeful moving into the future that that's the way to go, a more collaborative, facilitative approach. And using some of the authorities like under the Farm Bill and the Good Neighbor Authority is helping us to do that from the federal side.

Senator HIRONO. So it is not necessarily a one-size-fits-all, of course.

Mr. MOORE. No.

Senator HIRONO. But the key is for the stakeholders to be sitting together.

Mr. MOORE. Yes.

Senator HIRONO. And to identify what resources there are at the state, local and federal levels and to leverage those resources.

Something you mentioned that was interesting is that you are getting the financial industry in California to step in. I do not recall that there are any of our financial industries who are involved in these issues?

Mr. SMITH. Well, we're working on models for carbon sequestration and getting different private organizations involved so folks like Hawaiian Airlines and Coca Cola have been already mentioned, and we're looking at—perhaps Disney. Some of these folks that cater to the visitor industry and looking at trying to calculate carbon impacts of traveling and going on vacation and flying and all that.

These private companies are very interested in participating and trying to figure out how they can give back, how people that are traveling, how they can provide opportunities for people that are traveling to help offset some of the impacts of their activities. And so, that's——

Senator HIRONO. I think that is really important, because I would have liked to have somebody from our tourism industry be able to work with us today but we were not able to do that. Tourism is our number one industry and they, obviously, use a lot of water so they need to be at the table. Thank you very much for working toward that goal.

Did you want to add anything to this conversation?

Mr. ANTHONY. Yes, I'd like to point out two examples of partnership activities that, I think, are a good model to be thinking about.

And one being an effort that's taking part in the Western part of the United States is it has to do with the National Drought Resilience Partnership that President Obama had called for where it's bringing together federal agencies to form a federal action plan to help states and local entities build resilience toward drought.

And as you're well aware, there are many federal agencies that have a role in water, and there are efforts needed to help bring us together. This partnership, from what I'm hearing, has been quite effective and it's something that we've heard from the Western States Water Council that they're frustrated with federal agencies in that there are so many of them that deal with water and there needs to be better alignment in working toward common goals. And I think this partnership seems to be a good example of that.

The other is something that's been going on locally here in Hawaii which is a NOAA-funded effort called Pacific Research. With that effort there are researchers at the East-West Center and others at the University of Hawaii, and USGS is partnering with them to try to bring together decision making tools that are addressing not only water but land management decisions. One of their focus areas is Maui, and they've been interacting with county and state government officials trying to understand what are the land management plans of the future. And then USGS' role in that is trying to figure out how those changes in land use may impact prime water recharge and ultimately ground water availability.

Senator HIRONO. Okay.

I know that I am going to be working/following up with both of you regarding the various programs and whatever we can do to enable Hawaii to access more of the resources and programs and any other ideas because what is emerging, of course, is the need to bring everybody to the table in a way that doesn't drive everybody crazy, right? There are 50 people sitting here. We want to be efficient and effective in how we proceed.

Thank you very much to the second panel.

We will now move to our third panel, our last panel.

We have Matt Gonser, he is with the Extension Faculty with the University of Hawaii, Sea Grant College Program. The University has done a lot of work looking at water security issues and, as mentioned, recently received a $20 million grant from the National Science Foundation to study over the next five years water sustainability issues in Hawaii.

Next we have Trae Menard, Chair of the Hawaii Association of Watershed Partnerships. Trae works on Kauai and will provide not only the perspective of on the ground watershed protection but also some activities that are ongoing on our neighboring islands.

Next is Dr. Sam Gon, who is the Senior Scientist and Cultural Advisor with the Nature Conservancy of Hawaii, or TNCH. Dr. Gon, I look forward hearing from you, not only on the various watershed protection activities that TNCH is doing but also the importance of watershed protection in water security to the native Hawaiian community.

We will start with you, Matt.

STATEMENT OF MATTHEW GONSER, EXTENSION AGENT, COMMUNITY PLANNING AND DESIGN, UNIVERSITY OF HAWAII SEA GRANT COLLEGE PROGRAM

Mr. GONSER. Aloha and good morning. Thank you, Senator Hirono and the Committee for scheduling this hearing and allowing us to speak on the subject of integrated water management and efforts to improve Hawaii's water landscape. I also thank my fellow speakers for your important contributions on the subject today. Lastly, I thank Dr. Darren Lerner, the Director of the University of Hawaii Sea Grant College Program, Interim Director of the UH Water Resources Research Center and the University Director of the Pacific Islands Climate Science Center, for affording me this opportunity to speak and represent the Hawaii Sea Grant program.

The following is a summary of my full testimony which has been duly submitted for the record.

Thank you to the Senate for passing S. 2848, the Water Resources Development Act of 2016. There are critical reauthorizations, modifications and additions designated in that bill, specifically those in Title VII, Subtitle B and C, relating to clean water infrastructure and innovative financing, respectively.

We are also grateful to you, Senator Hirono, for highlighting areas that are important for Hawaii, such as making it easier for the Federal Government to enter into public/private partnerships for water infrastructure projects and directing the EPA to promote green storm water infrastructure projects.

Hawaii has a history of water quality and quantity challenges. In the last two years alone heavy summer rains from both named and unnamed storms resulted in significant disruptions, ground water advisories and temporary beach closures due to sewage spills at multiple locations.

In my work as an Extension Agent and member of the Hawaii Sea Grant faculty, I've heard strong local interest in receiving additional support, guidance and concentrated attention on topics of community greening, green infrastructure and flood risk reduction and resilience.

In addition to certain rain and storm water conservation and efficiency practices of water capture, recycling and reuse and the regulation of storm water at the parcel and building scale, there are opportunities for interventions within the public right of way that can provide multiple community co-benefits. This highlights the integrated management and resource needs connecting agencies such as the National Academy of Building Sciences, Federal Highways Administration, HUD and non-profit professional organizations with national memberships in the design and planning fields.

A case study in the challenges we are discussing today is the Ala Wai Watershed. The State, City, and County of Honolulu Corps of Engineers and community stakeholders have been engaged in efforts to understand and better manage the Ala Wai Watershed. These efforts were advanced this past legislative session with the adoption of House Concurrent Resolution 61 which endorses and supports the Ala Wai Watershed Partnership. With interest in a holistic systems approach to solving issues in the Ali Wai Watershed through Waikiki there are visions for ecosystem restoration, water quality improvements, flood mitigation and risk transfer and

a coordinating entity to implement these visions. Partners encourage the Congress' continued support of the Corps in the Ali Wai Watershed through necessary appropriations and authorizations and urges to use the full suite of tools provided through WRTA.

Trees are possibly the most conspicuous piece of environmental infrastructure and one that accrues benefits and becomes more valuable over time while also addressing other community, environmental and social justice disparities, choose our long-term investments with significant underappreciated returns on that investment.

I currently sit on the Advisory Council for the State DLNR Kaulunani Urban and Community Forestry Program. This program focuses on improving the health and viability of trees in Hawaii's urban and town centers. Funding for this program comes from the State and Private Forestry Branch of the USDA Forest Service. The work at DLNR, the Watershed Partnerships and Kaulunani are critical for a future green Hawaii and the programs appreciate Congress' continued support.

Lastly, communities statewide have benefited from various technical assistance opportunities offered through the EPA, FTA and NOAA. Just last week Hawaii Sea Grant in partnership with the City and County of Honolulu submitted an application to the EPA to gain support toward flood resilience. If awarded, your small investment into the EPA's Research and Services will be further leveraged and extended through Hawaii Sea Grant's statewide extension network providing greater returns on the EPA's building blocks for sustainable communities program.

The service of organizations such as Sea Grant within NOAA and WRRC and PI-CSC with the USGS continue to serve important research extension and education outlets for the vast and developing green infrastructure and climate and water resilience resources developed by EPA and others. Such activities only further federal resources, which is consistent with interagency partnerships and a 2011 Memorandum of Agreement between the EPA and NOAA, for example. This particular partnership identifies a strong Sea Grant role in delivering products, services, and research results to local community decision makers to meet the partnership's potential to serve state and local governments.

In closing, we thank the committee for its willingness to conduct this field hearing and work on these critical issues.

Thank you Senator Hirono for the opportunity to speak today and with respect to today's subject, we thank you for your continued support of the University of Hawaii and its Sea Grant College Program, Water Resources Research Center and Pacific Islands Climate Center.

[The prepared statement of Mr. Gonser follows:]

Matthew J. Gonser, AICP
Extension Agent, Community Planning and Design
University of Hawai'i Sea Grant College Program

U.S. Senate Committee on Energy and Natural Resources
2016 October 18

Aloha and good morning. Thank you to the Committee for scheduling this hearing and allowing us to speak on the subject of integrated water management and efforts to improve Hawaii's water landscape. An additional thank you to my fellow speakers for your important contributions on the subject. Lastly, I thank Dr. Darren Lerner, the Director of the University of Hawai'i (UH) Sea Grant College Program (Hawai'i Sea Grant), Interim Director of the UH Water Resources Research Center (WRRC), and the University Director of the Pacific Islands Climate Science Center (PI-CSC), for affording me this opportunity to speak and represent the Hawai'i Sea Grant program.

Water Resources Development Act of 2016 (WRDA 2016[1])

To begin my testimony, I would like to first thank the Senate for passing S.2848, the Water Resources Development Act of 2016. There are critical reauthorizations, modifications, and additions designated in that bill, specifically those in Title VII Subtitle B and C, relating to clean water infrastructure and innovative financing, respectively. We are also grateful to you, Senator Hirono, for highlighting areas that are important for Hawai'i, such as, making it easier for the federal government to enter into public-private partnerships for water infrastructure projects (e.g., with the U.S. Army Corps of Engineers for the Ala Wai Flood Mitigation Project) and directing the Environmental Protection Agency to promote green stormwater infrastructure[2] projects, which use natural features to reduce stormwater runoff.

Though not directly related to this bill, we are grateful for the continued support of the critical research produced from the National Academy of Sciences that address the integrated water discussion we are having today. As an example, I would like to highlight one 2016 product, *Using Graywater and Stormwater to Enhance Local Water Supplies: An Assessment of Risks, Costs, and Benefits*.[3] This is the type of exemplary research stakeholders continue to rely upon, which we then further translate to inform decision making at the local level.

Urban and Built Environment

In that same vein, I am pleased to offer an additional perspective today, an urban or built environment framework for the discussion. As you are aware Senator Hirono, Hawai'i has a history of water quality and quantity challenges. In the last two years alone, heavy summer rains from both named and unnamed storms resulted in significant disruptions and damages, brown water advisories, and temporary beach closures due to sewage spills at multiple locations. Though we are a coastal state, we also have pockets of populations that are conspicuously riverine, which highlights the islands' ridge and valley topography. This showcases the local

[1] S.2848 – 114th Congress (2015-2016): Water Resources Development Act of 2016
[2] Stormwater infrastructure is comprised of the system of landscapes (open spaces, urban trees and upland forests), curbs, pipes, and streams that transport rainfall runoff from mauka to makai, or from the mountains to the sea.
[3] National Academies of Sciences, Engineering, and Medicine. 2016. *Using Graywater and Stormwater to Enhance Local Water Supplies: An Assessment of Risks, Costs, and Benefits*. Washington, DC: The National Academies Press. doi: 10.17226/21866.

connection and understanding of environmental systems expressed as "mauka to makai," or from the mountain to the sea.

In my work as an extension agent and member of the faculty with the Hawai'i Sea Grant, and in close partnership with WRRC and PI-CSC, stakeholders, government partners, and community members have expressed strong local interest in receiving additional support, guidance, and concentrated attention on the topics of community greening, green infrastructure, and flood risk reduction and resilience. We can be challenged by what local planners, designers, and policy makers cite as Hawai'i's particular geographies (e.g., short and steep watersheds and "flashy" systems, distinct soils, and high water tables), unique climate patterns, and limited land availability for certain landscape practices for green infrastructure and flood resilience strategies. The spectrum of rural to urban community patterns adds additional complexity to how we effectively engage in different communities and deliver applicable resources. The sustainable communities-related challenges of environmental planning, ahupua'a and watershed management, and flood mitigation are integrated with other considerations, such as tradeoffs of land uses, and open space and agricultural land needs; (re)development and affordable housing needs; and, complete streets, clean and affordable transportation, and public health and active transportation.

Hawai'i's ocean users lament the time following medium to heavy rains across the islands and subsequent brown water advisories recommending against recreating for a day or two. These advisories are primarily the consequence of rainwater runoff, or stormwater. Stormwater runoff is the result of rainwater flowing over compact ground and other impervious surfaces into streams, ponds, storm drains, and the sea[4], and has been cited as the number one source of pollution in the state of Hawai'i. In Hawai'i, storm sewer pipes are separate from waste sewer pipes, and as a result, anything (water or otherwise) that enters the stormwater drainage system flows – untreated – directly to a stream or the ocean impacting water quality and nearshore environments. The U.S. Environmental Protection Agency (EPA) approaches stormwater management with a watershed and landscape infiltration philosophy of "slow it down, spread it out, and soak it in."[5]

Practices and techniques to manage and utilize these water resources before it enters the storm sewer system include low impact development (LID) and green stormwater infrastructure (GSI) practices, rainwater catchment, and a multitude of building and plumbing techniques for water capture, recycling, and reuse. Hawai'i has not kept current with adoption of new versions of building or plumbing codes, which would more readily permit and/or require such water conservation and efficiency practices.

In addition to the regulation of stormwater management at the parcel and building scale (e.g., infiltration, green/blue roofs, cisterns/rain barrels, rainwater and gray water reuse), there are opportunities for interventions within the public right-of-way (ROW) (e.g., biofiltration, street trees, flow through planters, and permeable surfaces that can provide multiple benefits, including aesthetics, urban ecological systems, and enhanced environmental conditions for walking and bicycling. These strategies are more and more becoming required by regulations and plans. This highlights the integrated management and resource needs, connecting agencies such as the National Academy of Building Sciences, Federal Highways Administration, Department of

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[4] Arnold, C. and Gibbons, J. 1996. Impervious surface coverage, *Journal of the American Planning Association*, 62(2): 243-58.

[5] http://www.epa.gov/owow/nps/lid/videofactsheet.pdf

Housing and Urban Development, and other professional organizations with national memberships in the design and planning fields.

This past August, with the support of an award from the National Sea Grant College Program Office, Hawai'i Sea Grant and WRRC organized and hosted a day-long summit to discuss how to advance practice and policy for green and livable communities, with a specific focus on water quality (i.e., polluted runoff control) and quantity management (e.g., catchment, recharge or reuse, flooding, and drought). We extend our gratitude to the additional program sponsors, and to Hawai'i State Senator, Mike Gabbard for joining us that day and providing opening remarks on the legislature's leadership on the subject. I regret that the event conflicted with Hawai'i State Representative Ryan Yamane's schedule, but thank him for his consideration at the time and input.

In addition to many local experts, other invited guests included experts from the City of Seattle Office of Sustainability & Environment and Seattle Public Utilities, the Center for Watershed Protection in Maryland, the Boston office of The Trust for Public Land, the U.S. Water Alliance and Smart Growth America both in Washington D.C., and the Horsley Witten Group in Massachusetts. This is an example of the types of partnerships we are discussing today and a demonstration of the need to leverage and share resources nationwide as we all work toward cleaner waters, water security, and green and thriving communities.

U.S. Army Corps of Engineers and the Ala Wai Watershed

A case study in the challenges we are discussing today is the Ala Wai Watershed. The state, City and County of Honolulu, and the U.S. Army Corps of Engineers (USACE) have been engaged in efforts to study and model the Ala Wai Watershed, which includes Makiki, Mānoa, and Pālolo valleys and their respective neighborhoods down to the ocean. These efforts have included investigating flood mitigation and other ecosystem enhancements, which, at present, sits as a draft feasibility study and integrated environmental impact statement for an Ala Wai Flood Mitigation Project.

Though that flood mitigation project has been ongoing for nearly two decades, there is renewed interest in this feasibility study co-sponsored by the USACE and the state. Unfortunately, though the original scope was to address multiple purposes, including water quality issues and ecosystem restoration, these components are no longer within the scope of the federal sponsorship – any secondary objectives must be carried forward by a non-federal sponsor (e.g., the state and/or a public private partnership (P3)). Stakeholders continue to note the importance of ecosystem restoration in the Ala Wai Watershed and believe the flood mitigation project represents a framework from which key opportunities can be sought to improve ecological and community health of the watershed.

Following a disaster mitigation summit in early 2015, stakeholders agreed upon main goals to move forward the various desires in the watershed. Stakeholders convened as the Ala Wai Waterhsed Partnership (AWWP), a multi-sector partnership that coordinates stakeholders across the public, private, academic, nongovernmental, community and philanthropic sectors with a joint interest in the Ala Wai Watershed. Hawai'i Sea Grant is a partnering member, providing technical expertise, facilitation support, and coordination efforts. The AWWP is committed to increasing communication with key community groups, engaging the private sector, and developing and implementing innovative financing and regional planning solutions.

Partners encourage the Congress' continued support of the USACE in the Ala Wai through necessary appropriations and authorizations, and urges using the full suite of tools provided

through WRDA. With interests in a holistic systems approach to solving issues in the Ala Wai Watershed through Waikīkī, there are visions for ecosystem restoration in the upland forests, streams and nearshore environments; water quality improvements in the streams, the Ala Wai Canal, and Māmala Bay; flood mitigation and risk transfer through watershed management, building and plumbing codes, and parametric insurance opportunities to shift the risk off the public sector and to engage the global capital market; and, to enable and stand up a coordinating entity to implement these visions.

Later this week the stakeholders and partners will expand because of additional interests of the Polynesian Voyaging Society in having a local focus area and beginning efforts for long-term impact in anticipation of the return of the Hōkūle'a and continued efforts of Mālama Honua.

U.S. Forest Service and Urban and Community Forestry Programs

I currently sit on the advisory council for the state Department of Land and Natural Resources (DLNR) Kaulunani Urban and Community Forestry Program. This program focuses on improving the health and viability of trees in Hawai'i communities through educational programs; financial support in the form of cost-share grants; technical training; Arbor Day promotions and public/private partnerships. Funding for this program comes from the State and Private Forestry Branch of the USDA Forest Service. The work Kaulunani is engaged in supports and is additive to the forestry and watershed management information provided by Administrator Smith and Chair Trae Menard, but with an emphasis in our urban and town centers. Additionally, there is a nascent cross-sector coalition working to increase our urban canopy statewide, to meet both near-term environmental goals and long-term climate adaptation goals. The work of DLNR, the Watershed Partnerships, and Kaulunani are critical for a future green Hawai'i and the programs appreciate Congress' continued support.

Trees are possibly the most conspicuous piece of environmental infrastructure, and one that accrues benefits and becomes more valuable over time. Trees are long-term investments with significantly underappreciated returns on investment. The heat mitigation and stormwater management benefits of a healthy urban forest can pay dividends on cooling and runoff management costs, while also working to address other community environmental and social justice disparities.

A recent study from Illinois demonstrated trees' ability to reduced runoff and discharge when co-located in a bioswale. The trees' transpiration accounted for nearly half to three quarters of the water inputs from precipitation and irrigation. [6] The co-benefits of trees for water management, heat mitigation, carbon sequestration, urban habitat, and social and emotional benefits of nearby nature warrant additional attention and resources.

Federal Partnerships, Innovations, and Technical Assistance

Communities statewide have benefited from various technical assistance opportunities offered through EPA's Office of Sustainable Communities. I am also aware of other support communities in Hawai'i have obtained through similar technical assistance programs offered from the Federal Transit Administration (FTA) and the National Oceanic and Atmospheric Administration (NOAA). Just last week Hawai'i Sea Grant in partnership with the City and County of Honolulu, submitted an application to the EPA to gain support towards flood resilience along our streams and the coast. If awarded, this small, but critical investment into the

[6] Scharenbroch, B.C., J. Morgenroth, and B. Maule. 2015. Tree Species Suitability to Bioswales and Impact on the Urban Water Budget, Journal of Environmental Quality. 45(1): 199-206. doi: 10.2134/jeq2015.01.0060

EPA's research and services will be further leveraged and extended through Hawai'i Sea Grant's statewide extension network in partnership with WRRC and PI-CSC to provide significant returns on the EPA's Building Blocks for Sustainable Communities Program. The service of an organizations such as Sea Grant within NOAA, and WRRC and PI-CSC within the U.S. Geological Survey (USGS), continue to serve important research, extension and education outlets for the vast and developing green infrastructure and climate and water resilience resources developed by the EPA and others. Such activities only further federal resources, which is consistent with interagency partnerships and a 2011 Memorandum of Agreement between the EPA and NOAA, for example. This particular partnership identifies a strong Sea Grant role in delivering products, services, and research results to local community decision makers to meet the partnership's potential to serve state and local governments.

As you know, Senator, Hawai'i is a small, but able community with deep interest in being leaders of sustainability and a model for other island and continental communities. The pursuit of these competitive funding and technical assistance opportunities to bring resources to bear for our communities is demonstrative of this fact. Recognizing the increasingly competitive funding environment, state, county, and non-governmental partners are diligently working to increase capacity to be successful when opportunities arise. We thank you for your continued support of these federal partnerships, of which the HUD-DOT-EPA Partnership for Sustainable Communities is necessary in helping to educate on the interconnected systems that impact our water resources, health and livability, and environmental quality.

It seems natural that other agencies could join in such partnerships to meet shared goals. It would be encouraging to see the Federal Emergency Management Agency (FEMA), USGS and NOAA, even more directly connected as described herein. There will also perhaps be an emerging importance of the Economic Development Agency in a changing climate and economy, as we look to bridge innovation across federal regions.

Lastly, I would like to highlight FEMA's National Flood Insurance Program (NFIP) Community Rating System (CRS), as important incentive-based programs that provides a framework for integrated water management. Though only two of Hawai'i's four counties are current CRS participants[7], there is interest from the other two counties in pursuing participation for the direct benefit to NFIP policy holders, but more importantly, for the utility of the guiding framework and menu of activities offered to mitigate flood risk, conserve and better manage our lands, manage stormwater runoff, and educate communities on existing and future hazards.

Closing Thank You

We thank the committee for its willingness to conduct this field hearing and work on these critical issues. Thank you Senator Hirono for the opportunity to speak today, and, with respect to today's subject, we thank you for your continued support of the University of Hawai'i and its Sea Grant College Program, Water Resources Research Center and Pacific Islands Climate Science Center.

[7] As a result of their classification level of 8 residents of both the Counties of Maui and Hawai'i receive 10% discounts on insurance premiums for structures located in a Special Flood Hazard Area (SFHA) and 5% discounts on insurance premiums for structures located outside of a SFHA.

Senator HIRONO. Thank you.
Mr. Menard.

STATEMENT OF TRAE MENARD, CHAIR, HAWAII ASSOCIATION OF WATERSHED PARTNERSHIPS, AND THE NATURE CONSERVANCY

Mr. MENARD. Aloha, Senator.
Senator HIRONO. Aloha.
Mr. MENARD. My name is Trae Menard, and I am providing testimony in my capacity as the Chair of the Hawaii Association of Watershed Partnerships and also from my perspective as the Coordinator of the Kauai Watershed Alliance for the last 11 years.

Really, you know, much of my testimony has already been covered so I'm going to excerpt it somewhat.

The fundamental concept behind the watershed partnership model stems from the realization that the only way to address the primary threats to the forest is to work across landowner boundaries and apply the necessary management actions consistently and at a large scale.

Before the partnerships these actions were occurring mostly on state and federal lands with very little private landowner cooperation. This resulted in fragmented protection.

For example, before the Kauai Watershed Alliance was formed in 2002 there was very little communication between the state and private landowners and virtually no forest protection actions taking place on private lands and very little interest in conservation in general. Today, as David Smith mentioned, the private landowners account for a significant portion of our watershed lands, upwards of 66 percent, and these private landowners are now committed to protecting watersheds and conserving native forests.

The partnership meetings are a forum to discuss everything from a variety of topics of the environment ranging from endangered species, invasive species, water issues and pollution. Whenever federal agencies are planning a particular action, like critical habitat designations, endangered species listings, they contact watershed partnerships so that we can facilitate communications with those private landowners.

For the past 25 years the coordinators of these partnerships and their staff have been constructing fences and removing destructive feral, hooved animals from thousands of acres of priority watershed areas throughout the state and controlling invasive plants, some of which use significantly more water than the native vegetation. In many cases, they've been active in preventing and controlling wildfires, combating forest diseases and pests, like Rapid Ohia Death, planting native trees and restoring degraded areas, educating the public about the cultural, economic and environmental importance of our forests. All of these actions are detailed in watershed management plans which are developed by the coordinators and approved by partners in each of the partnerships and then implemented by the coordinators and their staff.

The coordinators are responsible for compiling most of the environmental documentation and acquiring permits, with the help from their staff at the State Division of Forestry and Wildlife and holding public meetings. A typical day for the coordinators and

their staff can include working with local hunters on the location of the next fence, managing complex helicopter operations in bad weather, hiking miles through dense forest and rugged terrain, crossing raging streams or rappelling off cliffs. This is a difficult and dangerous job and requires highly-trained, very skilled and dedicated staff, willing to do whatever it takes to achieve the goals.

We've mentioned Governor Ige's goal, the 30 by 30, 30 percent of our watershed forests should be protected by 2030. We are currently protecting 15 percent and 5 percent of that has become protected in the last five years. If we are to meet this ambitious goal, we need to maintain the pace of adding new fenced and managed acres while maintaining the acres that have already been fenced and protected. Daunting as it may seem, the watershed partnerships are fully prepared to make this goal a reality. We have the technology, the experience, and the proven track record of success.

What we need is a constant flow of funding and this is where agencies like the Department of the Interior, the Department of Agriculture and even the Department of Defense can play a decisive role. We have a long history of working with the U.S. Fish and Wildlife Service, the National Park Service, the U.S. Forest Service, the Natural Resource Conservation Service and the U.S. Army among many more and hope to continue that relationship in the coming years.

In closing, I wanted to leave you with a quotation from Hawaii's first Territorial Forester, Ralph. S. Hosmer, "In Hawaii, the most valuable product of the forest is water, rather than wood. It follows that conservation of its watersheds by keeping them permanently clothed in protecting forests, is the chief duty of the forester."

The first foresters in Hawaii recognized the importance of watershed protection to sustain our fresh water resources and now it's our duty to carry on that vision and secure our future of Hawaii and its people.

Mahalo for inviting me to present to this committee.

[The prepared statement of Mr. Menard follows:]

Hawai'i Association of Watershed Partnerships

East Maui Watershed Partnership

East Moloka'i Watershed Partnership

Kaua'i Watershed Alliance

Kohala Watershed Partnership

Ko'olau Mountain Watershed Partnership

Leeward Haleakala Watershed Restoration Partnership

Mauna Kea Watershed Alliance

Three Mountain Alliance

Wai'anae Mountains Watershed Partnership

West Maui Mountains Watershed Partnership

url www.hawp.org

Testimony of Trae Menard, Chair of the Hawai'i Association of Watershed Partnerships, to the Senate Committee on Energy and Natural Resources October 18, 2016.

Aloha. My name is Trae Menard and am providing testimony in my capacity as Chair of the Hawai'i Association of Watershed Partnerships and from my perspective as the coordinator of the Kaua'i Watershed Alliance for the past 11 years.

Watershed partnerships are voluntary alliances between public agencies and private landowners who recognize that the best way to protect our forested watersheds and the source of our fresh drinking water was through collaborative management across landscapes. Starting with the East Maui Watershed Partnership, which formed in 1991, there are now 10 active watershed partnerships on all of the major islands with 74 partners, containing 2.2 million acres, roughly half of the entire state. The East Maui Watershed Partnership was one of the first watershed partnerships in the world and now the watershed partnership model is replicated nationally and globally. As such, Hawai'i is now broadly recognized as a leader in watershed management.

The fundamental concept behind the watershed partnership model stems from the realization that the only way to address the primary threats to the forest is to work across landowner boundaries and apply the necessary management actions consistently and at a large scale. Before the partnerships, these actions were occurring mostly on state and federal lands, with very little private landowner cooperation, resulting in fragmented protection. For example, before the Kaua'i Watershed Partnership formed in 2002, there was very little communication between the state and the private landowners, virtually no forest protection actions taking place on private land and very little interest in conservation. Today, private landowner partners account for over 600,000 acres, or 26% of the total statewide watershed partnership lands and are committed to the protecting watersheds and conserving native forests. The partnership meetings are a forum to discuss a variety of environmental topics, ranging from endangered species, invasive species, water issues and pollution. Whenever federal agencies are planning a particular action, like critical habitat designations or endangered species listings, they contact the watershed partnership first to facilitate communication with the key landowners.

For the past 25 years, the coordinators of these partnerships and their staff have been constructing fences and removing destructive feral, hooved animals from thousands of acres of priority forested watershed areas throughout the state and controlling invasive plants, some of which use significantly more water than native vegetation. In many cases, they've been active in preventing and controlling wildfires, combating forest diseases and pests, like Rapid Ohia Death, planting native trees and restoring degraded areas, and educating the public about the cultural, economic and environmental importance of Hawai'i's forests. All of these actions are detailed in watershed management plans, which are developed by the

coordinators and approved by the partners in each partnership and then implemented by the coordinators and their staff. The coordinators are responsible for compiling most of the environmental documentation and acquiring permits, with help from staff at the State's Division of Forestry and Wildlife (DOFAW) and holding public meetings. A typical day for the coordinators and their staff can include working with local hunters on the location of the next fence, managing complex helicopter operations in bad weather, hiking miles through dense forest and rugged terrain, crossing raging streams or rappelling off cliffs. This is a difficult and dangerous job that requires highly skilled, trained and dedicated staff, willing to do whatever it takes to achieve the goals.

Governor Ige, in his address to the World Conservation Congress, made the commitment to protect 30% of our watershed forests by 2030. That's 235,000 acres, fenced and free of damaging feral, hooved animals. We are currently protecting 15%, 5% of which became protected in the last five years. If we are to meet this ambitious goal, we need maintain the pace of adding new fenced and managed acres while maintaining the acres already protected. Daunting as it may seem, the watershed partnerships are fully prepared to make this goal a reality. We have the technology, the experience, and the proven track record of success. What we need is a consistent flow of funding, and this is where agencies like the Department of Interior, Department of Agriculture and even the Department of Defense can play a decisive role. We have a long history of working with the U.S Fish and Wildlife Service, National Park Service, U.S Forest Service, The Natural Resource Conservation Service and the U.S. Army and hope to continue that relationship in the coming years.

In closing, I want to leave you with a quotation from Hawai'i's first Territorial Forester, Ralph. S. Hosmer. "In Hawai'i, the most valuable product of the forest is water, rather than wood. It follows that conservation of its watersheds by keeping them permanently clothed in protecting forests, is the chief duty of the forester". The first foresters in Hawai'i recognized the importance of watershed protection to sustain our fresh water resources and now it is our duty to carry out their vision and secure the future of Hawai'i for its people.

Mahalo for inviting me to present the to the committee.

Trae Menard
Chair, Hawai'i Association of Watershed Partnerships
Coordinator, Kaua'i Watershed Alliance
Director of Forest Conservation, The Nature Conservancy, Hawai'i Chapter.

Senator HIRONO. Thank you.
Dr. Gon.

STATEMENT OF DR. SAM GON, SENIOR SCIENTIST AND CULTURAL ADVISOR, THE NATURE CONSERVANCY OF HAWAII

Dr. GON. Senator Hirono, if you'll indulge for a moment before I begin.

[Chants in Hawaiian.]

Senator HIRONO. Thank you.

Dr. GON. Aloha, Senator.

Senator HIRONO. Thank you.

Dr. GON. So, aloha, I'm Sam Gon, Senior Scientist and Cultural Advisor for The Nature Conservancy of Hawaii, State Chapter of the National and Global Conservation NGO.

In Hawaii we manage 14 preserves and work in 19 coastal sites partnering with government, private parties and local communities to help manage forests and coastal areas.

So, mahalo again for allowing me to testify at this field hearing.

Hawaii's native ecosystems once extended from the summits from each of islands to the sea and our cultural traditions reflect a long, close relationship with native forests. Hawaiians traditionally see ourselves as part of, not separated from, nature considering the plants and animals that share our world as kin, elders, ancestors. The land is aina, that which feeds us and its rich diversity help nurture and shape an equally rich and thriving island culture.

The forested upland watersheds, in particular, we're considered wao akua, the realm of gods and not for human incursion except for very specific needs and it restricts ceremonial protocols. Water came from the sacred forested realm to feed agricultural fields and fish ponds. Forest trees provided wood for temples, houses, canoes, tools. Forest plants were gathered for medicine, food, ornament and many other purposes.

Today, roughly half of our native land cover is gone, particularly from the lowlands and the vast majority of native plants and animals find refuge in our upland forests. We too still depend on that native forest for our survival and well-being.

Our forests are our primary watersheds. They protect our reefs and our beaches from runoff. They clean and cool our air. They soothe and renew our spirits.

And while historical impacts from agriculture, grazing, logging and development are responsible for much of the initial loss of native ecosystems, the threat today is ongoing degradation by invasive, non-native species, invasive animals that prey upon native species and spread disease and invasive plants that compete with and displace native ecosystems. In doing so they transform our forests by simplifying forest structure, altering soil composition, increasing the risk of fire and diminishing watershed function. Fresh water is actually quite a limited resource in the middle of the Pacific.

Hawaii's latitude at 20 degrees is not a high rainfall zone, but for the topography and the forest cover of our Hawaiian high islands we would actually have very little fresh water. Trade winds moving across the ocean encounter our tall islands. Air is pushed

upward rapidly into lower temperature and pressure. Airborne moisture condenses creating clouds and rain, the classic orographic effect.

But cloud and fog interception by Hawaii's forest increase total water input by as much as 50 percent above the base annual rainfall. The 30 percent you cited earlier, that was from previous studies and it was on Kahala, in fact, the most recent numbers indicate closer to 50 percent.

Senator HIRONO. Okay.

Dr. GON. Intact Hawaiian forests, therefore, act as a living sponge, collect fallout rain and moisture and slowly deliver this water into our aquifers and streams, absorbing greenhouse gases and greatly reducing runoff. And on Oahu it's where 85 percent of Hawaii's population lives, the forested Ko'olau Mountains alone provide 135 billion gallons of fresh water annually or about half of Oahu's ground water recharge.

Seen or unseen that same forest function operates on all the main islands providing each island's water supplies.

Despite some reprieve during the last two El Niño years, several locations in the state have experienced prolonged drought and it's intensifying again. Now we're seeing more frequent and more severe storms that increase destructive runoff, but at the same time we see less total rainfall overall at higher temperatures that impact our watershed health and encourage outbreaks of pests and diseases.

We've seen a century long trend of decline of rainfall here and even sharper declines in recent decades. Recent studies have shown that native forests are better at capturing rain water and recharging aquifers that forests degraded by invasive species. In response to these troubling development we're taking action to mitigate and adapt to bolster the resilience of our natural and human communities.

Conservancy is working with our conservation partners, public and private throughout the islands to protect our precious forested watersheds. Our strategic approach is focused on managing our statewide network of forest preserves and—oh, really, no. [Laughter.]

And integral parts of the larger public/private watershed partnerships.

In conclusion, we see opportunities here for greater collaboration and we want to take this opportunity to thank you for being a champion of the Land and Water Conservation Fund's Hawaiian Forests at Risk project.

We want to fix the U.S. forest wildfire funding mechanism, as you pointed out.

Senator HIRONO. Yes.

Dr. GON. And provide equity for Hawaii and the Federal Endangered Species recovery funding so that it's more truly proportional to the very large numbers of the threatened and endangered species found here.

Thank you very much.

[The prepared statement of Dr. Gon follows:]

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Testimony of Dr. Sam 'Ohukani'ōhi'a Gon,
Senior Scientist and Cultural Advisor, The Nature Conservancy of Hawai'i
United States Senate Committee on Energy and Natural Resources
Field Hearing on Water Security in Hawai'i, October 18, 2016

The Nature Conservancy of Hawai'i is a private non-profit conservation organization dedicated to the preservation of the lands and waters upon which life depends. The Conservancy has helped to protect nearly 200,000 acres of natural lands in Hawai'i. We manage 40,000 acres in 14 preserves and work in 19 coastal communities to help protect the near-shore reefs and waters of the main Hawaiian Islands. We forge partnerships with government, private parties and communities to protect Hawaii's important watershed forests and coral reefs.

Aloha, I am Dr. Sam Gon and I am the Senior Scientist and Cultural Advisor for The Nature Conservancy of Hawai'i. The Nature Conservancy of Hawai'i is the state chapter of The Nature Conservancy, a private non-profit conservation organization dedicated to the preservation of the lands and waters upon which life depends.

Hawaii's native ecosystems once extended from the mountains to the sea, with forests of several types extending from near sea level to as high as nearly 9000 feet on our tallest mountains. Hawaiian cultural traditions reflect a long, close relationship with native forest, and Hawaiians saw themselves as part of, not separate from, nature; considering themselves direct kin of the plants and animals that shared their world. The land was 'āina, "that which feeds," and its rich diversity helped shape an equally rich and thriving island culture. The forested upland watersheds were considered wao akua, the realm of the gods, and not for human incursion except for very specific needs and under strict ceremonial protocols. Water came from this sacred forested realm fed lo'i (taro fields) and fishponds. Forest trees provided wood for houses, canoes, and tools. Forest plants were gathered for medicinal and many other purposes.

Today, roughly half of our native land cover is gone and the vast majority of Hawaii's native plants and animals find refuge in the upland forests, in large native landscapes across the islands. The Islands' native forests are among the world's biological treasures, sheltering more than 10,000 native species – more than 90% of which are endemic, that is, found only in these islands. Today, many of these species are rare, threatened and endangered with Hawai'i holding one of the highest percentages of endangered plants and animals in the nation. Several of these now endangered species were once so common that they were culturally important; examples include rare hardwoods like kauila and uhiuhi.

People still depend on native forests for their survival and well-being. Forested lands are our islands' primary watersheds, supplying us with hundreds of billions of gallons of fresh water each year. Our forests protect our reefs and beaches from destructive run-off and sediment, clean and cool our air, and are our best defense against flood and drought. While the historical impacts from agriculture, grazing, logging, and development are responsible for much of the loss of native habitat, the greater threat today is the destruction wrought by invasive plants and animals. Invasive animals prey upon native plants and animals and spread diseases. Invasive plants crowd out native species and compete with them for food and habitat. Over time, these pests transform the forests they invade, simplifying their structure, altering soil composition, increasing the risk of fire, and endangering our future water supply.

Easily available fresh water is not a limitless resource here in the middle of the Pacific. On the latitude of Hawai'i it doesn't rain much in the Pacific Ocean. But for the topography and forest cover on our Hawaiian high islands, we would have very little fresh water. Warm trade winds blow across the ocean. When they encounter the steep windward slopes of the Hawaiian Islands they are pushed upward, cool and condense creating cloud moisture and rain. Upland Hawaiian forests that are not overrun by

invasive species act like a sponge, collecting that rain and moisture, slowly delivering fresh water into aquifers and streams, absorbing greenhouse gases, and reducing runoff and siltation into near shore waters during storm events. The native ʻōhiʻa and koa forest canopy along with a diverse native understory creates the watershed system that collects fresh water, feeding surface and groundwater systems, making life in these islands possible.

Cloud and fog interception by Hawaii's forests increase total precipitation by as much as 50% above the base annual rainfall. On O'ahu (where 85% of Hawaii's population lives), the Koʻolau Mountains provide 135 billion gallons of fresh water annually, or about half of O'ahu's groundwater recharge. East Maui mountains provide 60 billion gallons of fresh water per year. The University of Hawai'i estimated that the cost to replace lost fresh water, runoff control, recreational, cultural, aesthetic and other ecosystem service values from O'ahu's Koʻolau forest would be $7.4 - $14 billion.[1]

Though we have had some reprieve during the last two El Niño years, several locations in the state have experienced prolonged drought and that is beginning to happen again. We are seeing other likely effects of climate change which science indicates likely will include:

- More frequent and more severe storms that can increase runoff and siltation; but
- Overall, less rainfall in many locations and therefore less fresh water; and
- Higher temperatures that affect watershed health and can be beneficial to pests.

The University of Hawaii's Rainfall Atlas[2] catalogues a century of declining rainfall, with an increase in the rate of that decline in recent decades and fewer trade wind days. Summer temperature records have been broken across the state and a record number of storms took aim at Hawai'i over the last few years. In 2014, tropical storm Iselle hit Hawai'i island hard. Fallen invasive albizia trees left the Puna area a quagmire of damaged houses, blocked roads and downed power lines. At the same time, native ʻōhiʻa and koa forests in the area were virtually undamaged. These same native forests are also showing that they are better at capturing rain water and recharging aquifers than invasive species such as strawberry guava.[3]

In response to these conditions, we must plan and implement mitigative and adaptive measures to ensure the resilience of our natural and human systems. One of the most effective tools we have to help address the effects of climate change in Hawai'i is to protect our forests. Healthy and diverse Hawaiian forests act like a sponge, collecting rain and moisture from passing clouds, slowly delivering fresh water into streams and aquifers, absorbing greenhouse gases, and reducing runoff and siltation into near shore waters during storm events.

The Conservancy is working with our conservation partners—public and private—throughout the islands to protect our precious forested watersheds. Our strategic approach is focused on:

- Managing our statewide network of forest preserves;
- Helping to build and manage Watershed Partnerships that include our preserves; and
- Advancing new methods and technologies to control invasive animals and weeds.

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[1] Roumasset, J., J.B. Kaiser, N. Krause, D. Mecham and J. Wooley. 1997. Draft Environmental Valuation and the Hawaiian Economy. University of Hawai'i Economic Research Organization, UH- Mānoa.
[2] http://rainfall.geography.hawaii.edu/
[3] Giambelluca, T. W., Delay, J. K., Asner, G. P., Martin, R. E., Nullet, M. A., Huang, M., Mudd, R. G., Takahashi, M. 2008. *Stand Structural Controls on Evapotranspiration in Native and Invaded Tropical Montane Cloud Forest in Hawai'i.* American Geophysical Union, Fall Meeting 2008, abstract #B43A-0422.

There are a number of opportunities for greater collaboration and support:

- Congress should reauthorize and provide full dedicated funding for the Land and Water Conservation Fund. (See, Attachment 2) We thank Senator Hirono for leadership in this regard.
- Congress should pass the Wildfire Disaster Funding Act for a stable budget approach to wildfire suppression without raiding other important forest health programs. (See, Attachment 3)
- Hawai'i should receive an equitable share of federal endangered species recovery funding such that it more proportionately represents the numbers of threatened and endangered species here.
- Enhanced local, state and federal support is needed for public-private watershed partnerships (www.hawp.org), forest management tools and infrastructure like fencing.
- Continued development of leading edge technologies and tools are critical for forest management.
- Enhanced federal partnerships and funding are needed for the U.S. Depts. of Agriculture, Interior and possibly the Defense Department for research, technology development, biosecurity, biocontrol research, disease management, and watershed partnerships.

Mahalo for the opportunity to testify today. Having dependable supplies of clean fresh water is of critical importance not only to an island state like Hawai'i, but to the nation and the world as we work together to address and adapt to the effects of a changing climate.

Attachments
1. Before and After Hawaiian Watershed Photos
2. Land and Water Conservation Fund Handout
3. Wildfire Disaster Funding Act Handout

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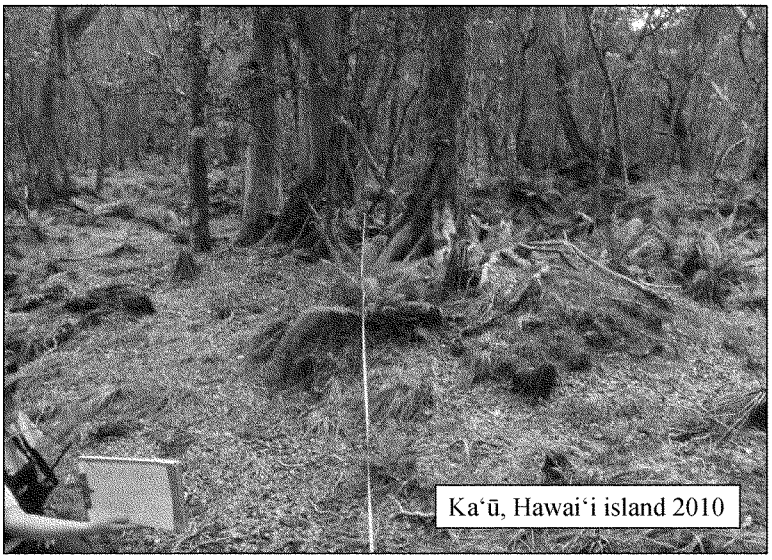
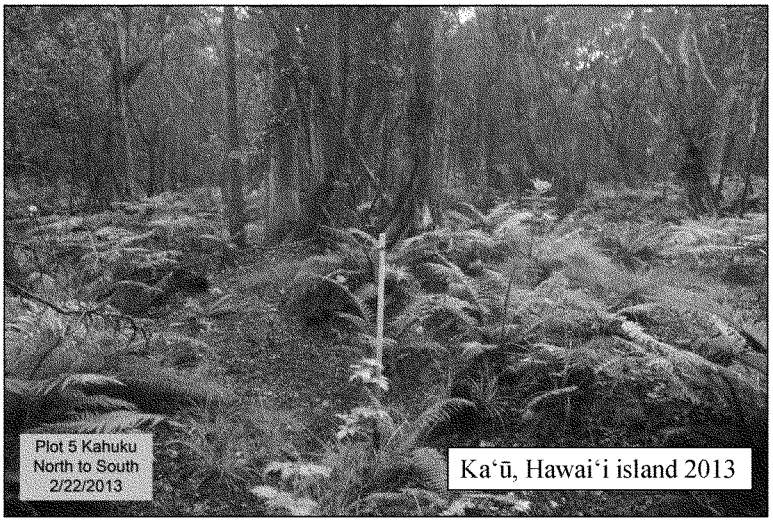
Attachments to the Testimony of Dr. Sam ʻOhukaniʻōhiʻa Gon,
Senior Scientist and Cultural Advisor, The Nature Conservancy of Hawai'i
United States Senate Committee on Energy and Natural Resources
Field Hearing on Water Security in Hawai'i, October 18, 2016

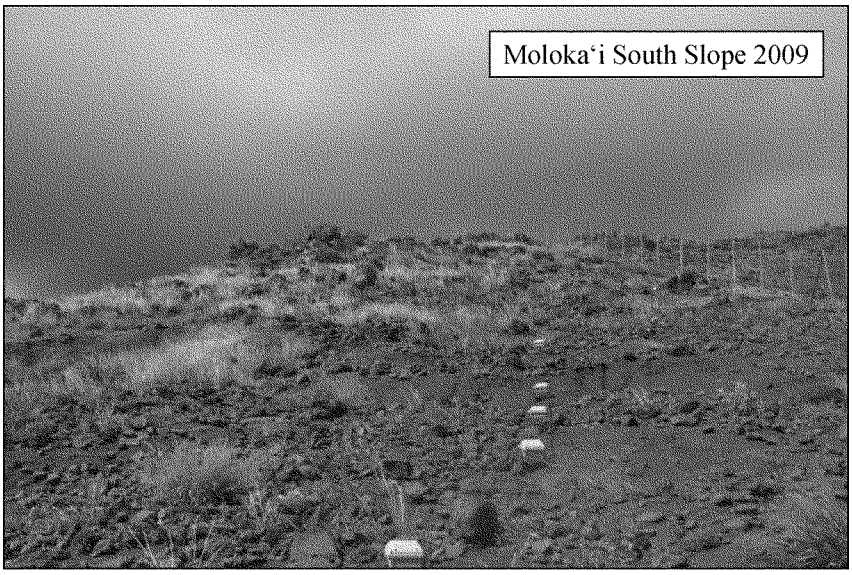
Attachment 1: Before and After Hawaiian Watershed Photos
Attachment 2: Land and Water Conservation Fund Handout
Attachment 3: Wildfire Disaster Funding Act Handout

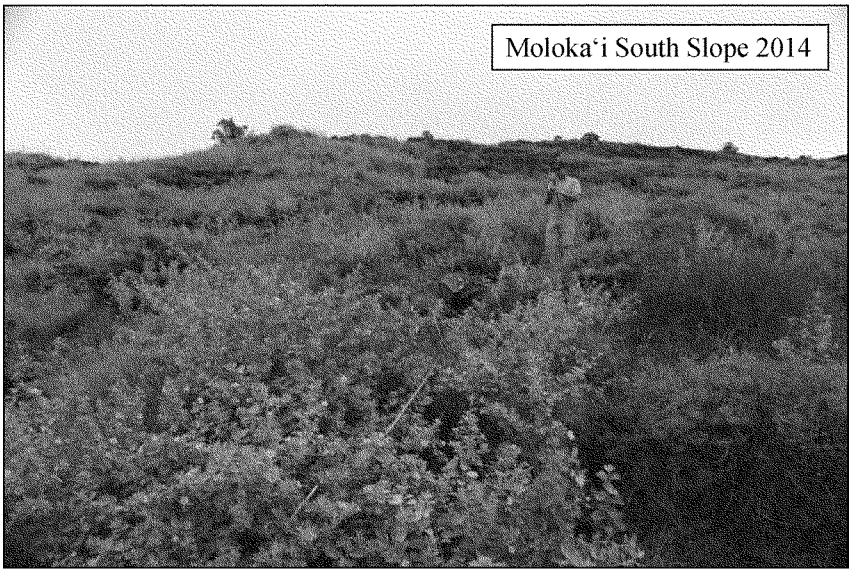
Attachment 1

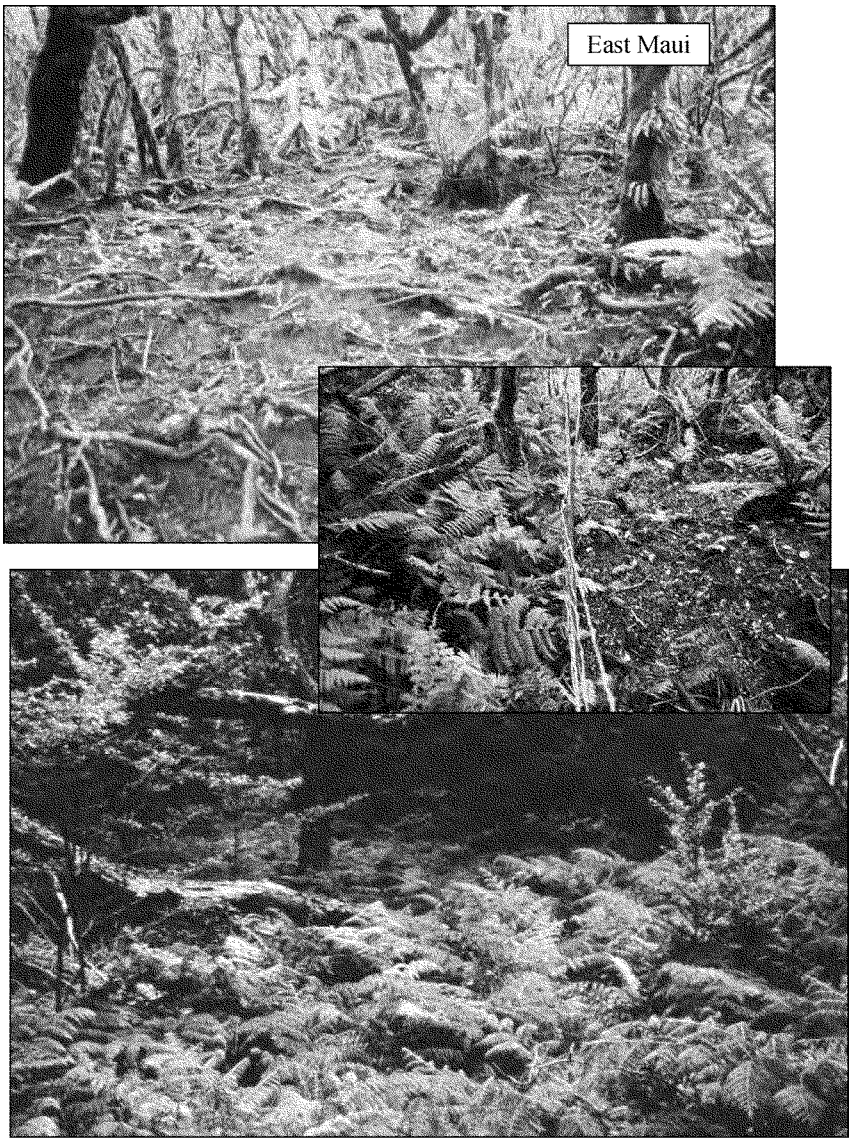
Before and After Fencing and Animal Control
Selected Priority Hawai'i Watershed Areas

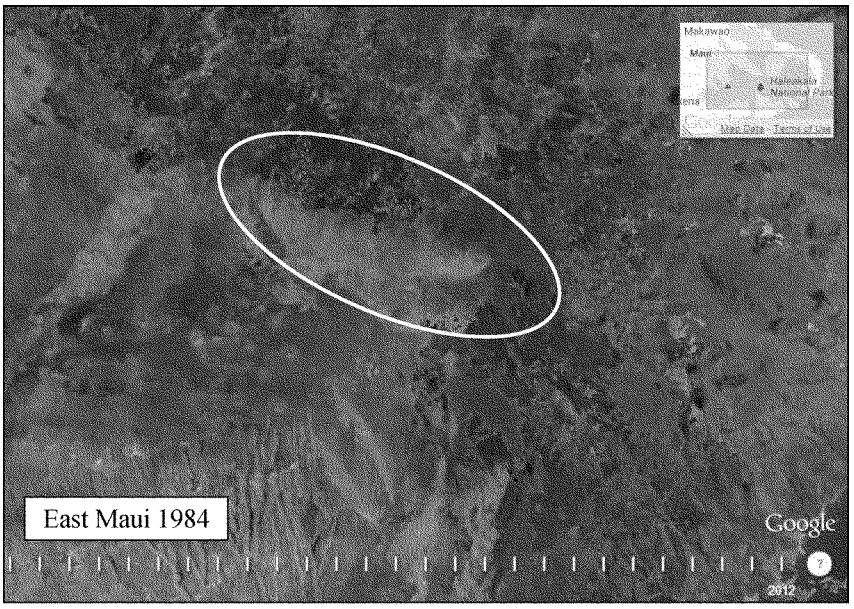





Moloka‘i South Slope 2009


Moloka‘i South Slope 2014


East Maui


Makawao
Maui
Haleakala National Park
Map Data Terms of Use
East Maui 1984
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2012


Makawao
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Haleakala National Park
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East Maui 2012
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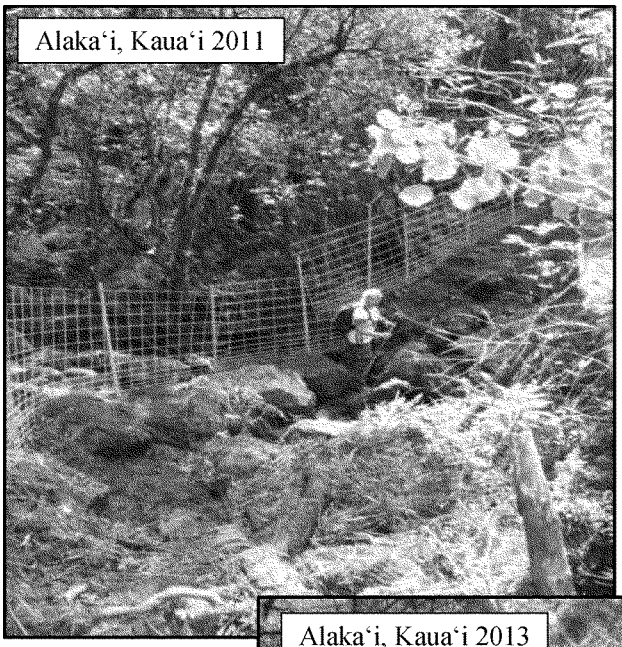
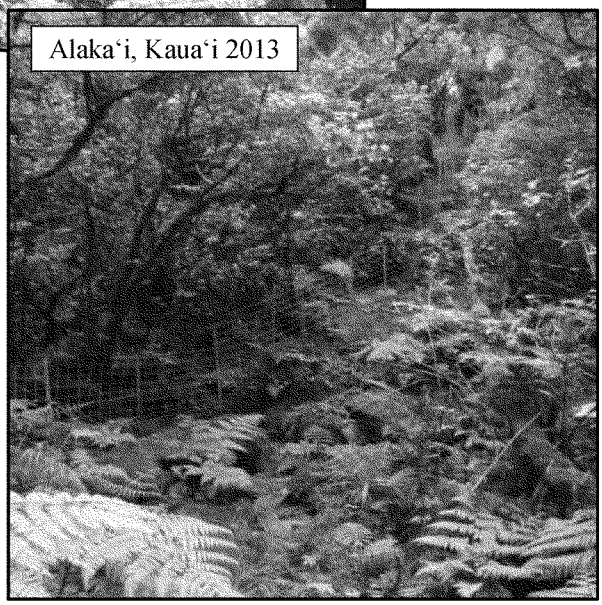
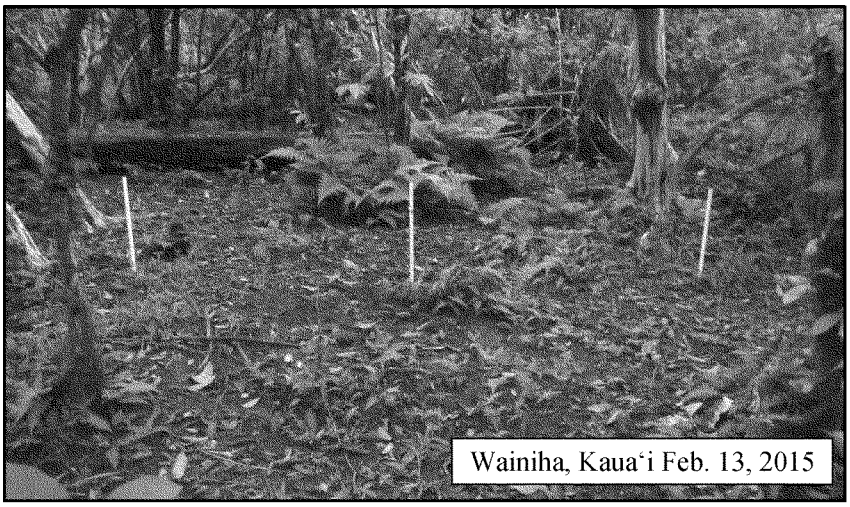

Alakaʻi, Kauaʻi 2011


Alakaʻi, Kauaʻi 2013


Wainiha, Kaua‘i Feb. 13, 2015


Wainiha, Kaua‘i July 17, 2016

Healthy land. Clean water. Recreational opportunities. Vibrant working landscapes.

Support full funding of the Land and Water Conservation Fund.

The Nature Conservancy supports protecting America's land and water through full funding and permanent reauthorization of the **Land and Water Conservation Fund (LWCF)**. We seek to reconnect Americans to nature by restoring critical large landscapes such as the Everglades and Flint Hills Conservation Areas.

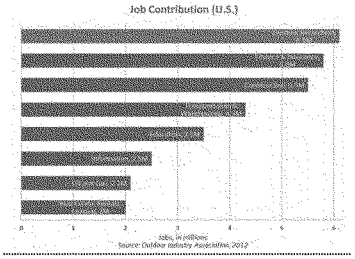
Funding for LWCF is provided by revenues from offshore oil and gas drilling and directed toward multiple public benefits:

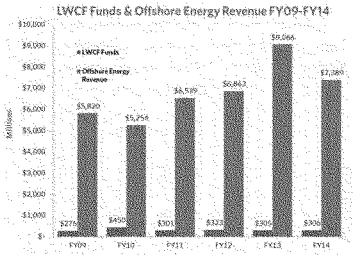
- Important recreational access for hunting & fishing
- Natural areas that sustain clean water and provide other community benefits
- Working farms and ranches
- National parks and forests
- Neighborhood parks and trails
- Historic battlefields and cultural sites
- Fish and wildlife refuges

Overview of the Fund

The Land and Water Conservation Fund's goal is to balance the extraction of oil and gas resources with conservation by using a portion of drilling fees to protect important land and water resources.

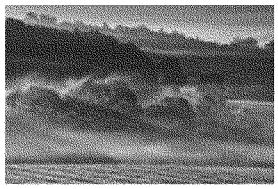
The program is authorized to receive a small percentage of offshore oil and gas revenues—up to $900 million per year—but most of these funds have been diverted elsewhere. With 50 acres of farm and ranch land lost to development every hour in the United States, according to American Farmland Trust, it is critical that we ensure funding for the LWCF for the next generation of conservation.



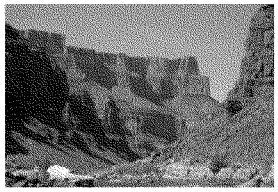


Note: LWCF funds include federal & stateside funding, Section 6 and Forest Legacy programs.

For FY15, the Department of Interior estimates approx. $5.2 billion will be collected from offshore energy production. Only $306 million was set aside to protect America's land and water.



Great Smoky Mountains National Park has been supported by LWCF. It is America's most visited national park. Credit: © Daniel Ewert



Some of America's most iconic places, such as the Grand Canyon in Arizona, have been protected through LWCF. Credit © Jean Calhoun/TNC

Americans Strongly Support Protecting Our Land and Water

A 2013 poll from Public Opinion Strategies found:

- More than 85 percent of Americans support funding the Land and Water Conservation Fund at its authorized level of $900 million per year.
- Nearly nine in ten voters opposed future diversions of funding. Support came from 93 percent of Democrats, 84 percent of independents, and 78 percent of Republicans.

Progress on LWCF in 2016

As a part of a larger energy package, Sens. Lisa Murkowski, R-Alaska, and Maria Cantwell, D-Wash., crafted an approach that permanently reauthorizes LWCF with positive changes. It maintains the program's current flexibility and includes a critical oversight role for Congress.

The Senate passed the LWCF package with wide bipartisan support in its version of the energy bill (S. 2012) in April. The Nature Conservancy supports this framework. We ask the Senate and House to keep the Senate version of LWCF in the final energy bill.

Conservation = Economic Gains

Sustained investment in LWCF will stimulate our nation's economy, create jobs and protect our infrastructure. LWCF makes substantial contributions by strategically securing the economic assets that our federal, state and local public lands represent:

- Each year, outdoor recreation drives $646 billion in direct spending and supports 6.1 million jobs in America, according to the Outdoor Industry Association. *(See Table 1, front side.)* It also brings $80 billion in federal, state and local tax revenue.
- Considering the ripple effect of outdoor recreation activity (including the impacts of spending, jobs and wages as they circulate further throughout the economy), those numbers grow to $1.6 trillion in economic impact and 12 million jobs.
- Property values of homes near parks and protected areas are often more than 20 percent higher than similar properties elsewhere.
- Visitor-driven business stimulates the economy in local communities surrounding national parks and other public lands.
- Protecting water sources through watershed, forest and wetland conservation is often a cost-effective way to ensure clean and adequate water supplies.
- The "value of ecosystem services provided by natural habitat in the 48 contiguous United States amount to about $1.6 trillion annually, which is equivalent to more than 10 percent of the U.S. GDP," according to a 2011 report for the National Fish and Wildlife Foundation.

Contact: Tom Cors | Director, Lands | The Nature Conservancy | (703) 841-5300

Attachment 3

Wildfire at Florida Panther National Wildlife Refuge, credit: Josh O'Connor, USFWS

A fire funding solution, like the Wildfire Disaster Funding Act, would create a stable budget approach that 1) funds wildfires with disaster funding, 2) minimizes impacts from borrowing, and 3) addresses the increasing costs of suppression over time, allowing for reinvestment into forest health activities.

Over the past two decades, fires have increased in severity, intensity and cost, and the fire seasons have grown longer. However, the structure for wildfire budgeting has not changed and is significantly impacting important non-fire programs. The U.S. Forest Service (USFS) and Department of the Interior (DOI) are responsible for federal fire-fighting response and bear the full burden for funding those activities from their annual budgets.

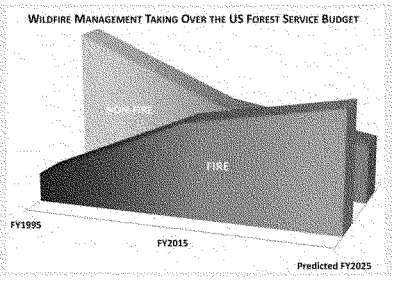
When suppression costs run high, appropriators are forced to shift funding to the ever-increasing proportion of the budget that is devoted to fire suppression, leaving less for programs that restore and manage forests.

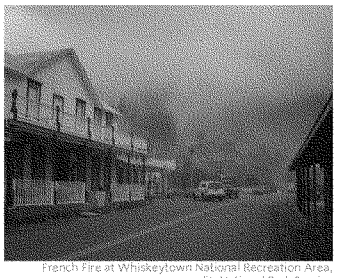
Often, that funding is still not sufficient, which forces the agencies to borrow money from other programs to make up the difference. This practice of funding non-fire programs less and then "robbing Peter to pay Paul" has led to decreased budgets for many important programs such as the National Park Service, Fish and Wildlife Service, and even Forest Service projects aimed at decreasing the severity of wildfires in the first place.

An approach like the Wildfire Disaster Funding Act will fix this inefficiency and reduce the devastating impacts that fire borrowing have had on people, water and wildlife.

Fire Suppression, by the Numbers

- In 1995, fire management accounted for 16% of the USFS budget; today it is more than half. At the current rate, it is expected to make up two-thirds of the agency's budget by 2025.
- USFS and DOI have run short on fire-fighting **twelve** times since 2002.
- USFS transferred **ten** times since 2002; $700 million in September, 2015.





French Fire at Whiskeytown National Recreation Area, credit: National Park Service

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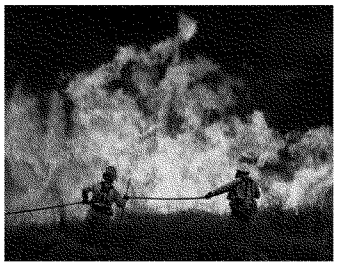

Nevada wildfire, credit: U.S. Fish and Wildlife Service

A fire funding solution must include all of the following:

1) A full 100 percent of *normal* fire funding activities will continue to be funded through the appropriations process (the 99 percent of wildfires that are predictable).

2) Additional firefighting activities would be funded using disaster funding similar to that currently used by the Federal Emergency Management Agency (FEMA) for natural disasters.

3) The practice of borrowing or transferring funds from non-suppression accounts to make up for funding shortfalls would be minimized.

The bipartisan Wildfire Disaster Funding Act (WDFA) meets these criteria by amending the Balanced Budget and Emergency Deficit Control Act of 1985.

In addition, any forest management proposal that may be linked to fire funding must emphasize science-based restoration that promotes collaboration.

Fixing the fire funding problem will ensure that the increasing costs of firefighting do not continue to drain other programs, and will allow appropriators new flexibility to reinvest in restoration programs.

Broad, Bipartisan Support

WDFA is the most widely supported fire funding solution in Congress today. It addresses the problems of transfers and increasing suppression costs by accessing disaster funding.

More than 300 organizations representing a diverse range of interests support WDFA, including conservation, sportsmen, timber, tribal, firefighting, and recreation groups.

There are currently more than 150 bipartisan members of the House and Senate cosponsoring the Wildfire Disaster Funding Act.

Contact: Cecilia M. Clavet, Senior Policy Advisor | The Nature Conservancy | (703) 841-5300

Senator HIRONO. Thank you, and I want to thank you for starting your testimony with a chant. Thank you very much.

Okay, so, I want to thank the panelists. This is the last panel, and this is a question for all of the witnesses. Do you think there is a role for federal agencies to play in landscape-scale watershed protection in Hawaii? If so, what would that role look like and would it be a program to provide grants for certain activities? Would it be the federal agencies assisting existing partnerships to provide technical assistance? What would the ideal federal role look like to you?

Mr. GONSER. Sure, thank you.

I would just like to offer and go back to your original points about what a watershed is and reminding ourselves that in our discussions today we're certainly focused on our upper forested watersheds, but that common outlet is the sea. So we need additional consideration for where we inhabit so, the state urban lands and understanding that landscape scale strategies will be vastly different in the conservation lands versus those urban and town centers.

The landscape of funding opportunities seems to be shifting more toward competitive opportunities. I'm a little cautious toward that because of, you know, our small population. There's only so much new initiative we can try to take on at any one point in time.

So if there are ways to increase some of the support for programs that were discussed earlier today and from my colleagues here, that would be beneficial, but also reconsidering ways we can utilize the state revolving water funds for infrastructure type projects, either for both clean drinking water, but also some of the green infrastructure and the recharge to reduce the rainfall runoff would be additionally beneficial.

Senator HIRONO. I will get back to you after the other two witnesses have made a comment.

Mr. MENARD. Sure.

I think, you know, from the watershed partnership's standpoint, we do work with multiple federal agencies both in the funding aspect as well as some of the technical expertise like, for instance, from the USGS.

I think one of the main benefits of working with the Federal Government is through the funding, obviously, and the ability of the watershed partnerships to be able to leverage state funding, private funding, to help actually provide match for federal funds.

In the past, we've been able to get federal funding for fencing projects, particularly on Kauai, where I work, during the downturn, economic downturn, we were able to get funding through the Forest Service through the ARRA program. And that was—and that enabled us to actually hire a local fence contractor to construct our fence. And that actually saved a lot of jobs.

And so——

Senator HIRONO. Are you talking about the ARRA?

Mr. MENARD. Yeah, the ARRA funds in 2011, I believe?

Senator HIRONO. Okay, yes.

Mr. MENARD. So——

Senator HIRONO. It was a one shot deal.

Mr. MENARD. It was a one shot deal.

Senator HIRONO. Yes.

Mr. MENARD. But it came——[Laughter.]

Senator HIRONO. Thank you for maximizing what you did with that money.

Mr. MENARD. Yeah.

You know, I think going forward, one of the biggest challenges I mentioned in my testimony is not only building more fences to keep pace and to achieve that 30 percent goal, but also to maintain the areas that we've already fenced off.

And I think one of the, you know, like there's a quote from Kurt Vonnegut, that I like to use that one of the fundamental human flaws is that everybody wants to build and nobody wants to maintain. And I think that, you know, the more funding we can get to, not only build more fences, but also enable us to maintain what we've already got is going to be, you know, very important to reach that goal.

Senator HIRONO. In line with that comment we have huge infrastructure needs throughout our country to the tune of trillions. We need to address those.

Did you want to add something, Dr. Gon?

Dr. GON. Certainly.

I'm currently serving as the Chair of the Hawaii Conservation Alliance. That Alliance is a group of Federal, state and private organizations that together have combined to try to minimize the amount of duplication and to maximize the optimization of our efforts together in conservation in Hawaii. It includes the National Park Service, the Fish and Wildlife Service, the Forest Service, The Nature Conservancy of Hawaii, Kamehameha schools, Office of Hawaiian Affairs, State of Hawaii Division of Aquatic Resources. You name it. If it's an organization in Hawaii that's dealing with conservation, the Hawaii Conservation Alliance includes those members.

Now it was through our efforts that we were able to pull together the resources and the arguments to bring the world to Hawaii for the——

Senator HIRONO. IUCN?

Dr. GON. Right, yes. Just recently and it was an amazing opportunity for us to demonstrate the power of that kind of collaboration of Federal, state and private organizations and bringing a focus on conservation.

Therefore, the idea of how to fund our efforts here in Hawaii is a matter of coordination of the existing programs and ensuring that the highest priority management occurs. And in the conservation alliance the idea of protecting those large watersheds, those large landscapes of remaining native dominated ecosystems in Hawaii that provide so many services to us, is the way to go. And we get together and talk about what the National Park Service, the Fish and Wildlife Service and all of the federal agencies are doing and how we can best coordinate those kinds of efforts.

So, I think that that would be one excellent route to bring to bear focus and optimize the federal opportunities that might be here.

Senator HIRONO. So, Matt, just very briefly I know that UH recently, as I mentioned before, received $20 million. Was that a competitive grant that the University of Hawaii sought and got?

Mr. GONSER. I actually am not so familiar with the opportunity that was offered.

Senator HIRONO. Okay.

Mr. GONSER. I believe it was the Science Foundation. I can't actually——

Senator HIRONO. Yes, so the National Science Foundation. It is a five-year study. That is a hefty amount for a study, sustainability in terms of water. So we will talk to the appropriate person. I guess it is not you, but you are doing other good things.

Mr. GONSER. Thank you.

Senator HIRONO. Alright.

Some of the things you mentioned leads me to this next question to all of you. Do you think that it would be helpful that federal agencies, such as the EPA, NOAA, DOI, USDA and I think I also heard FTA, DOD, all these federal agencies that have something to do with the subject matter at hand, formed a watershed protection council at the federal level to align their various watershed protection efforts and make accessing information and resources easier and support on the ground efforts that folks, such as you, are doing? Would that help to create a Federal Watershed Protection Council?

Mr. GONSER. I'm not sure on say, the specifics of a title for it, but it sounds sort of in line with what has been a really successful Federal partnership between EPA, HUD, and DOT, the partnership for sustainable communities which really helps to educate the interconnectedness of all these systems that impact whether it's water resources, health or environmental quality.

So along those lines but perhaps there are certainly better ways to bring in some of those federal agencies that don't necessarily get so engaged in the extension and education whether it's FEMA, through flood risk reduction because that, obviously, has a landscape and water component, others in NOAA and USGS as well.

Sure, I could certainly see to Sam's, Dr. Gon's, point of better opportunities for coordination just to continue to maximize the investments that are already in place.

Mr. MENARD. Yeah.

Senator HIRONO. Mr. Menard.

Mr. MENARD. I think from my experience working with multiple agencies, it would be beneficial to have some kind of council where they could coordinate a lot of their actions, in particular, from the funding standpoint. Some agencies have certain requirements for grants that are different than other agencies, and certain agencies are going to be focused on funding a particular thing, like if there's a lot of endangered species in a particular area then that's the place to go, you go to the Fish and Wildlife Service. If it's a forest protection project, then you go to the Forest Service.

I mean, I think that coordinating between those agencies and being able to say, okay, let's make sure that these guys get enough money to do the endangered species stuff and protect, you know, this much watershed and enough to get to the Forest Service to

make sure that there's enough fire protection and other forest pathogens and pest money to go toward also protecting that.

I think sometimes I wonder if there's somewhat of a competition for funding and maybe there could be some better coordination so there's maybe less overlap and conflict.

But yeah, I mean in general I think it works fairly well. I mean, we've, like I said, we've gotten a lot of support from the federal agencies.

Senator HIRONO. Yes.

Mr. MENARD. And we've been able to make that work.

Senator HIRONO. So this is not an idea to try to get another group of people who are siloed. The whole idea is to break through the silos?

Mr. MENARD. Right.

Senator HIRONO. And to maximize our resources which are scarce enough as they are.

Did you want to comment?

Dr. GON. Yes, certainly.

I think that the model that we have here in Hawaii with the Hawaii Conservation Alliance, as I mentioned, was built out of exactly that kind of frustration with the idea of slightly differing mandates, different ways of mobilizing funds, different mission statements.

And so, what the conservation alliance has been able to do over the course of its existence since, gosh, well before this millennium, certainly, is to identify what each of those mandates allow them to do and then to work to optimize the total picture of what the state, federal and private organizations within the state can do. So it was built, kind of, out of a desperation of the fact that we had so many endangered species, limited size, great pressures on our native ecosystems to preserve them and you know.

As a result we have been able to work out a very amazingly cooperative relationship, and I think that same kind of relationship can be forged at a national level.

Senator HIRONO. Okay.

Because it is not the easiest thing to identify all of the various federal resources and whatever grants there are because each one has a slightly different set of requirements and outcomes and all of that. It would help if everything were, sort of, put in one place so that as we deal with these issues that are common to all of us then we can do a better job. I will probably continue to talk with you folks and some of our federal agencies to see whether this is a fruitful idea.

Trae, do you think that the state's goal of protecting 30 percent of Hawaii's priority watersheds by 2030 is adequate and achievable? You noted that prior to 2002 there was not that much private sector, private landowner engagement in protecting our forested watersheds and now they are much more engaged. Maybe you can explain why this changed? Were there some tax incentives or something like that, and do you think that 30 by 30 is an achievable goal and what do we have to do to get there?

Mr. MENARD. Okay.

Well let me start with, you know, I'm at mainly on Kauai.

Senator HIRONO. Okay.

Mr. MENARD. There was not a lot of private landowner involvement. There has been, prior to that, there was quite a bit of private landowner involvement on East Maui where the first watershed partnership was formed.

Senator HIRONO. Yes.

Mr. MENARD. And so I think that was the model that we were following on Kauai.

Senator HIRONO. Yes. And there are now ten, right?

Mr. MENARD. Yeah.

Senator HIRONO. Those partnerships?

Mr. MENARD. Correct, yeah.

But yeah I think when I first started as a Coordinator on Kauai and we started with the first watershed partnership meetings, and we got everybody in the same room together and people were just, kind of, looking at each other and going, wow, this is the first time we've ever really all sat down and had a conversation.

And so I think from there, you know, I think that really developed into a base of trust so that when we were able to start moving forward on a plan and developing, you know, plans for fencing and for large scale invasive species control that would cross boundaries. I think that that level of trust needed to happen prior to that, you know. So now we're able to build fences across boundaries and including multiple landowners. I think before the partnership that probably wouldn't have happened.

So that gets to the point of is it achievable? I believe it is because with these partnerships the communication is important because now when we do these large scale projects, you know, all the rights of entry, all the legal paperwork, all the, you know, differing processes that each landowner has and each agency has, you know, we can consolidate that into one meeting, essentially, and say, okay, this is the plan. How many of—you know, everybody is on board. There's a—it kind of greases the wheels administratively to get these things done. And so when we do get the money we're able to mobilize and get the money on the ground quickly and get the job done within the timeframe, you know, the allotted timeframe.

I think that the reason I believe it's achievable is, like I said, we've achieved that in the last five years we've got that five percent. And so if we stay on track and maybe with a little bit of an acceleration, by 2030 I think we'll be really close to 30 percent. Yes, I do think it's achievable.

Is it going to be easy? No. It's not going to be easy. And it's probably going to be increasingly more difficult as we get, as we approach that 30 percent goal.

I think right now when we first started doing this we really kind of grabbed the low hanging fruits in terms of the lands that we were going to target, the most logistically simple, the politically simple, places that didn't have much conflict. And I think as we approach that 30 percent at the end we're going to need to really work hard to, you know, with communities and be able to really focus on achieving that. But I think, I do believe it is possible. Yes.

Senator HIRONO. I do realize that on the neighboring islands projects such as fencing, are really important. I wonder whether on Oahu, which is a much more urban situation, are we doing enough

to pay attention to the call outs on Makaha, for example, in terms of protecting the watersheds on Oahu?

Mr. GONSER. I'll let Trae speak more about the partnerships in general but for example, the Ko'olau watershed partnership, as you might imagine, stretches the entire range of the watershed. But the similar practices of removal of invasive flora and fauna and the reintroduction of native species in combination with the fencing, as I understand, is still the primary strategy and has proven successful across the state.

Mr. MENARD. Yes, I would say that yeah, it has improved quite a bit in the last few years. The watershed partnership in the Ko'olau has been able to put in some significantly sized fences and really achieve some pretty big goals.

I think really when you look at the Ko'olau it's a challenging, it's a really challenging watershed partnership because when you look at, if you look at a landowner map there's, I don't know, a lot. There's probably more landowners per acre on the Ko'olaus than anywhere in Hawaii.

And so that's always a challenge because when you're trying to do a big project with multiple thousands of acres that's even more landowners that you have to get and have an agreement with and being able to really, kind of, coordinate with. But nonetheless, they've been, they've really worked hard and they've been very successful so far at getting some areas fenced off in the central part of the Ko'olaus.

The other challenge, I think, in the Ko'olaus is that it is an interface of very intensive urban development. So like, particularly in the Southern Ko'olaus where you folks work, I mean, I think that's even more critical to work in collaboration with the more urban watershed partnerships and be able to come up with strategies that span that interface. And I think that's going to be challenge but I think that's where it's exciting. I think it's a very exciting opportunity to do that.

Dr. GON. I'd like to add to that by pointing out that since 85 percent of the population of the state is on the island of Oahu there is an opportunity to educate and bring awareness up for the majority of the state's population by engaging more focused effort in the protection of both Ko'olau and Wai'anae watersheds.

The watershed history, as Dave Smith pointed out earlier, in 1903 the very first forest reserves in what would be the United States, is something that means that there's a long standing tradition of protection of our watersheds and recognition that those upland forests are essential, essential to our survival in the long run.

It's easy to be disconnected from that system but I think everyone looks up into the mountains, sees that green watershed and it's easy to make that connection visually that that forest is essential to our life and to the water supply of this island, the most populated one.

So, if we were going to put together a program to enhance both watershed development and protection on both the Wai'anae Mountains and Ko'olau, it's been done before. The arguments are there in place. We have a long history of very compelling statements about the importance of this. The Board of Water Supply would be right on it, of course. And I think that everyone in the state and

on the island of Oahu is in a position to understand, grasp and appreciate how important those kinds of projects would be.

Senator HIRONO. Mr. Menard, you talked about all of the multiple landowners. How do we incentivize them to work with all of you to protect our watersheds? As I mentioned, are there tax incentives in place or what do we have to encourage them to come to the table?

Mr. MENARD. Well I think there are tax incentives in place for entering into conservation agreements, conservation easements and so forth and I also work for The Nature Conservancy and they've done a fair amount of those as well as the Mayan Trust and so forth. Those are, obviously, probably, the most direct incentive to, you know, to do conservation on their lands.

You know, from the standpoint, like on Kauai, the landowners were incentivized by the very need for water.

Senator HIRONO. Okay.

Mr. MENARD. Some of our landowners were particularly concerned about the availability, the future availability of water, some of them had hydroelectric operations, others had agricultural operations that relied on the water from the forest.

And so, when we first started talking about protecting the watershed they didn't really approach it from hey, this is going to be—we need some kind of a financial incentive to do this. They actually saw the need for it, and they actually realized it.

You know one of the things like we talked a little bit about dams and so forth, when sediment runs down streams and fills up reservoirs or clogs up intakes, that's a big maintenance issue for them. And I think one of the landowners that we worked with on Kauai was particularly interested in eliminating a lot of the causes of that erosion.

So, you know, there are incentives outside of just basic tax incentives and financial incentives, at least in the short term.

Senator HIRONO. I have a question for you, Dr. Gon. You and many folks in this room today know the land in Hawaii, of course, is very expensive and add to that the resources necessary to protect and conserve the land or in some cases, rehabilitate the land, and pretty soon you have a very large price tag.

Can you speak to the importance of the Land and Water Conservation Fund, in helping landowners and land managers here in Hawaii to protect our forests and our watersheds?

Dr. GON. Certainly the idea of being able to protect the lands and waters, the forests and the ecosystems that we rely on with funds that are devoted to the protection of those resources, that's an extremely important incentive. It goes hand in hand with just the inherent value, cultural, water and other of the values that go with those forested ecosystems.

So, we certainly, as we said, thank you for being a champion of the Land and Water Conservation Fund and I think that there are huge opportunities in Hawaii for the application of those funds.

The nice thing is that we've got a limited acreage. We know where those important forested areas are. We know the connections between the land and water resources. And so we would be able to move quickly to apply those funds in Hawaii.

Senator HIRONO. You were talking about you thinking that there is an awareness in the state of the importance of our watersheds. Do you agree with that, that there is a general population awareness of the need to conserve water and that it is not a finite resource in Hawaii?

Mr. MENARD. I would say that it needs to be, that that needs to improve.

Dr. GON. There's always a need for improvement, but I think that the Board of Water Alliance and various other folks have made it pretty clear to the population at large of the need to conserve of the fact that we have limited water supplies and maybe, to a lesser extent, of where that water comes from and what it depends on in order to maintain a supply into the future.

Senator HIRONO. For example, you said that on Kauai the landowners there saw the need, so it is not as though they needed a financial incentive to step forward and do what needed to happen. Places like California, where they experience droughts and where it is very clear that water is a finite resource there, and they put in all kinds of programs that we have never had to do here such as not flushing toilets and all of that.

I am just not sure whether there is that connection from a consumer standpoint, because don't we consume more water in the state per capita than any other state?

Dr. GON. That may be true.

Senator HIRONO. We are way up there in terms of consumption.

Dr. GON. We also, at least on this island, have huge water resources, and I think that that has allowed us to be complacent about these kinds of things.

Senator HIRONO. Yes.

Dr. GON. Therefore, the recent droughts on Maui and Hawaii, in particular, are beginning to draw attention to the fact that one size does not fit all across the archipelago, that there are places in which the water resources are in a different state and that there's much more need for conservation and for protection of the sources of that water.

Oahu might be, you know, it rains pretty much every day and so people get a feeling of, they get complacent about that kind of thing. They look up into the mountain and they see that it's generally green and so you get the feel that our forests are in good shape. Whereas, those who know the conservation challenges of invasive weeds and the simplification of our forest watersheds and therefore a degradation of their ability to act as watershed. Those kinds of things are not so forefront in the minds of people, and I think that that needs to be enhanced.

Senator HIRONO. Yes, especially as the reality is that our aquifers are having to support a lot more people, a lot more tourists, and I think there is more we can do along those lines.

Do you think that there is a particular awareness among the Native Hawaiian community as to the importance of water?

Dr. GON. I think that there is very easy to find very cogent arguments for the importance and the connection between forested watersheds and water supply in Hawaii in traditional knowledge.

And so, that is certainly clear in the messages that were placed at the IUCN World Conservation Congress.

And so, the impression was that people in Hawaii were cognizant of those kinds of things. But I think that although Hawaiian knowledge is going to be important in pointing out and making the connections between people and place and people and forests and the importance of native species and forests, in general. Not everyone is in the state of sufficient enlightenment along those lines. And there's always room for education and improvement in awareness.

Senator HIRONO. Before you began your testimony you did a chant. Could you just briefly tell us what——

Dr. GON. Yes. It talked about how Oahu is clad in Oku Oku and the mist that cleans the mountain and that this is a mist that provides water to the Ohi Alawaka which is a type of Ohia tree in legend with white flowers on one side and red flowers on the other. And it talks about how that mist comes into the mountains and how the upright cliffs allow the rains to come and provide water to us, to us all.

It speaks to an integration of the nature of just natural phenomena in the mythology and in the stories and in just the awareness of natural process to bring water to the land and provide life to people. So, that's what that totally was about it.

Senator HIRONO. Thank you.

Dr. GON. I felt that it was an appropriate one for this particular session.

Senator HIRONO. Yes.

Dr. GON. So that's why I shared it.

Senator HIRONO. It was.

Dr. GON. And thank you for giving me the opportunity to point out some of the features of that oli and why it was shared.

Senator HIRONO. Thank you.

The cultural aspects of how the people of Hawaii feel about our environment are very unique.

Dr. GON. And in fact, rapid Ohia death on Hawaii island, where Mary Monarch came it was an opportunity for disaster if the world came to Hawaii, moved around on the island there and then moved to other islands and spread that disease to other islands.

Senator HIRONO. Yes.

Dr. GON. But it was the Hawaiian community and the Mary Monarch organizers that took the leave and make sure to minimize the amount of Ohia Lehua that was going to be used in ornamentation.

Senator HIRONO. Yes.

Dr. GON. And also to make sure that there was an opportunity to dispose of any lay materials so that it stayed on that island rather than moving back to the other islands. I think that cultural awareness and the cultural practitioners were really important in staving off what could have been an archipelagic disaster.

Senator HIRONO. Yes, thank you for pointing that out.

Matt, you bring to the table the unique perspective of planning and design. Do you feel that groups in Hawaii understand the importance of and are amenable to designing urban spaces to incorporate green infrastructure and decrease demand on Hawaii's fresh water resources? And can you provide some examples or your as-

sessment of what future projects and developments of this perspective may be particularly important for?

Mr. GONSER. Thank you for that question.

I shared their sentiments about levels of awareness and education and always opportunities to increase that. I'm glad you asked this question because I was going to offer that though we're speaking about water volume or water quantity which is a very important discussion, I think we need a really full court press on water quality issues, particularly in our urban and community areas.

The same ways that we can make that direct connection with the environmental services at green or public spaces or trees, as I alluded to before, serve as they're trying to work in the upper forest to really manage water where it falls. We need a similar approach in our community and town centers.

Either we need to do it voluntarily or in the next several rounds of our NPPS permits we'll be required to. So it's really the opportunity to get ahead of the game, to manage it onsite.

I alluded to the public right-of-way because I really think it's a public right-of-way meaning either building-to-building or sidewalk-to-sidewalk. It's really our streets that the conspicuous relationship that we all have with this, which is our public space, though primarily for automobiles. If we can reintroduce nature and think about urban street trees through our Kaulunani urban and community forestry program and other programs at the county levels, I think that's a huge opportunity to both mitigate heat island as well as manage water onsite and will just become more and more important as our rain conditions evolve and change.

Research coming out of an arboretum in Illinois recently found that of all the water inputs into a bioswale that had trees planted, so a bioswale meaning a slightly depressed area for water to infiltrate, filter somewhat, perhaps overflow into another area from the irrigation and rainfall these trees in bioswales were managing 50 to 75 percent of that water. So it was evaporating?

So just the ability of these, I would call them, urban forests to help us both green Hawaii's communities and manage rainfall onsite, I think, would become integral as we move forward.

Senator HIRONO. Urban forests, that is an interesting thought. Do we have any such thing on Oahu?

Mr. GONSER. We do.

Senator HIRONO. Where?

Mr. GONSER. Actually Oahu has some of the best information of its urban canopy. There's a new urban kind of via assessment going out in the next couple of years and through Administrator Smith's—as I mentioned, the Urban and Community Forestry program which receives Forest Service funding from the USDA and is managed through the DLNR. They've been the ones managing the grant moneys to then do these assessments.

The sad story is in this next roll out I believe we'll have seen a five-percent decrease over five years of our urban canopy. So, as I mentioned, these are long-term investments. They hopefully have long and healthy lives. So we need to start planting them now for the future.

Senator HIRONO. When you talk about urban forests, do you mean is it a matter of planting trees, maybe particular kinds of trees in our urban environment?

Mr. GONSER. I would say the science is out. We still need more information on which species could provide those benefits I alluded to of urban heat mitigation and the storm water management.

But when I say urban forestry, I really mean everything outside of our state conservation lands. It would be that expansive from our densely urban to our suburban and even to our rural town centers.

Senator HIRONO. So, for example, if we had pocket parks throughout our community then it would matter what kind of trees are planted in those parks because I don't know that there was much consideration given to those aspects of helping our water issues.

Mr. GONSER. Yeah, and again, I'm just going to make a plug for the streets as they're essentially rivers or conduits for rainwater to flow.

Senator HIRONO. Yes.

Mr. GONSER. Expediently to the ocean. So if there are ways to repurpose.

Senator HIRONO. Yes.

Mr. GONSER. Again, that which is our public space, to provide these other sustainability and community benefits that I believe are consistent with the values of a lot of the residents of the state. I think that's a very important opportunity to re-envision how we can be a green community and a model moving forward.

Senator HIRONO. Are we doing well in terms of the kind of considerations in our landscape that you just mentioned?

Mr. GONSER. In short, we can do better but we do have complete streets policies which is a little bit off topic but it's about reallocating space for multiple modes of moving about our communities. And there are segments in there that include considerations for green infrastructure and urban forests.

Senator HIRONO. Thank you. Thank you very much. I want to thank our three panels and, of course, the Governor and our Senator and Representative and our people who came from the mainland. Thank you very much.

I hope that maybe you can spend at least another day here or so to see what our environment is like and what our culture is like because I very much welcome the opportunity for Members of the Administration to come to Hawaii and to see that Hawaii is much more than a tourism and military place, important as those activities are to the State of Hawaii.

Please, feel free to work with my staff on any places that you could go to experience some of the aspects of Hawaii that will enable you to become advocates for us as we go forward.

For this last panel, thank you very much for all that you do.

There will be an opportunity for people who want to submit questions, let me see, there are magic words that I am supposed to say. [Laughter.]

In terms of the record being open.

The official record for this Committee hearing will be open for two weeks and after this hearing should anyone want to submit

any written testimony, you can do so by sending your testimony to testimony@hirono.senate.gov. For Senators and their staff, Members of the Committee or not, questions for the record are due by the close of business tomorrow.

Thank you very much. I know that we will be working with you as we go forward. This is a very important topic. While the Energy Committee deals with what would seem to be energy issues, I really wanted to bring focus on the importance of our forested watersheds and that it is a part of the Energy Committee's jurisdiction.

Mahalo nui loa to each of you.

This hearing is adjourned.

[Whereupon, at 12 p.m. the hearing was adjourned.]

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