APRIL 2013

Wai Halana

Hawaii Flood News

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

Who'll Map the Rain?

Story by Jon Letman

Story originally appeared in the Feb/Mar 2013 issue of Hana Hou magazine

The light was fading, the wind was raging and the temperature had fallen below fifty degrees. Rain was crashing down in what's known in Hawaiian as Kahakiki, a violent downpour. A long and fruitful day of hiking on the rugged eastern edge of Maui's Haleakala National Park had gone from hot and sunny to storm-driven whiteout, leaving two hikers struggling up a steep slope covered with dense ‘ohi‘a forest.

The hikers—Dr. Tom Giambelluca, a geography professor at the University of Hawai‘i at Manoa, and his then-graduate student Trae Menard—had spent the day slogging through native forests to repair climate stations used to measure, among other things, rainfall. Trudging beneath the weight of their heavy packs, the two were at seven thousand feet with only vague directions to a simple structure encouragingly called "grassland cabin." The rain was pounding so hard, water was flowing six or eight inches deep over the ground. Caught in the maelstrom, the pair thought, "This might be the end." But eventually they found the cabin—a crude plywood structure—and there they remained trapped as hundred-mile-an-hour winds and ceaseless kahakiki blasted the mountain for three days straight in the worst storm to hit the park in sixteen years.

"I'm a field guy," Giambelluca says today, recalling that March 1996 storm. "I've had a lot of experiences with Hawaiian rainfall—not all of them good." Nonetheless, Giambelluca still calls Hawai‘i "the most interesting place in the world to study rainfall." He has dedicated his career to helping people better understand Hawai‘i's weather and climate, and what he and Menard (who is today director of forest conservation for The Nature Conservancy

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Upcoming Events

Annual FMA Conference & 2-D Modeling Symposium

Sept 3-6, 2013

Marriott Resort, Anaheim, CA

Creating a Safer Tomorrow:

Building Resilience through Integrated

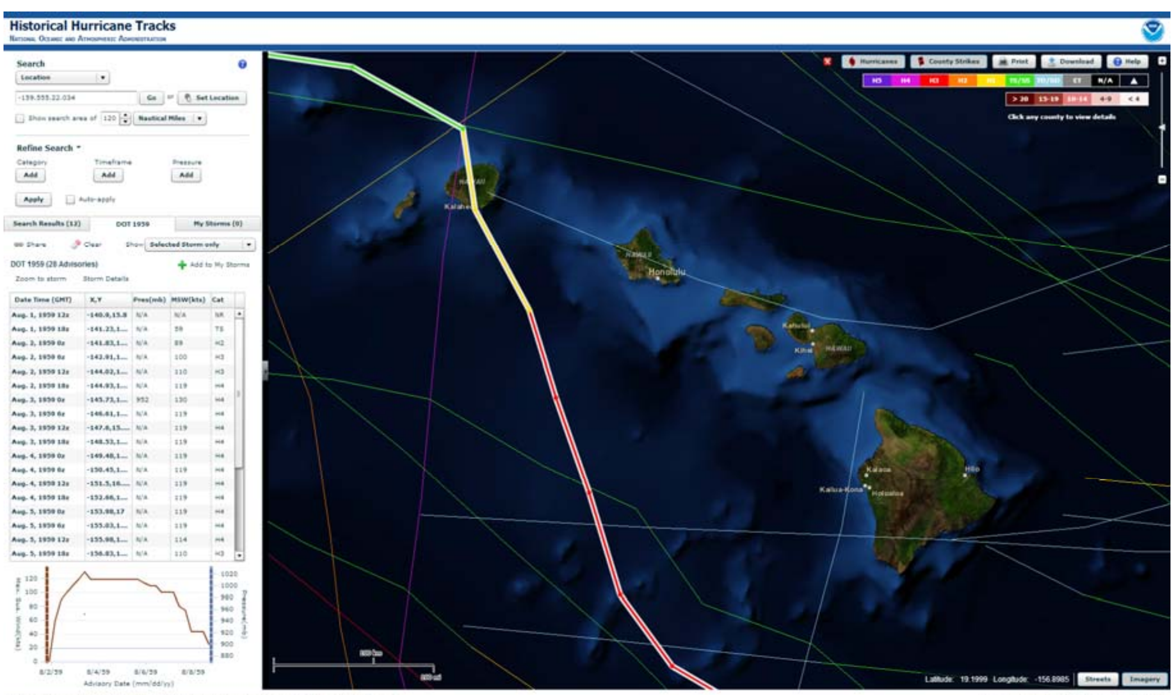
Flood Risk Management

http://www.floodplain.org/pages/annual-conference

Historical Hurricane Tracks

http://www.csc.noaa.gov/digitalcoast/tools/hurricanes

DIGITAL COAST
NOAA COASTAL SERVICES CENTER



This interactive mapping application easily searches and displays global tropical cyclone data. Users are able to query storms by the storm name, ZIP Code, city, state, geographic region, or latitude/longitude coordinates. Custom queries can track storms of interest and allow for data extraction and download.

Upcoming Changes to the NFIP – Recent Flood Insurance Legislation Will Affect Subsidized Rates for Pre-FIRM Buildings

The Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12), which was signed into law on July 6, 2012, requires FEMA to take steps to eliminate a variety of existing flood insurance subsidies and calls for a number of changes in how the program operates. Here is some information about these changes.

Change starts January 1, 2013
Subsidized premium rates for pre-Flood Insurance Rate Map (pre-FIRM) non-primary residences in Special Flood Hazard Areas (SFHAs) will begin to increase by 25 percent a year until they reflect full-risk rates. A pre-FIRM building is one that was built before the community's first flood map became effective and has not been substantially damaged or improved.

Read Write Your Own (WYO) Bulletin W-12043.

There will be more changes in the future
Some older residences in high-risk zones have been receiving subsidized insurance rates based on their pre-FIRM status. Subsidies will be phased out for severe repetitive loss properties consisting of 1-4 residences, business properties, and properties that have incurred flood-related damages where claims payments exceed the fair market value.

What is a Primary Residence?
For flood insurance rating purposes, a primary residence is a building that will be lived in by the insured or the insured's spouse for at least 80 percent of the 365 days following the policy effective date. If the building will be lived in for less than 80 percent of the policy year, it is considered a non-primary residence.

Please keep in mind, FEMA is still determining how this legislation will be implemented, so please keep in touch with your Write Your Own insurance (WYO) Company for underwriting assistance.

Read Write Your Own (WYO) Bulletin W-12109.

Changes already in effect – wildfire 30-day waiting period exception
Some changes went into effect the day BW-12 became law. BW-12 also includes an exception to the 30-day waiting period for coverage of wildfire-related flood damage. The policyholder's damage must be due to flooding on Federal land caused, or exacerbated, by post-wildfire conditions on Federal land. This 30-day exception was implemented July 10, 2012.

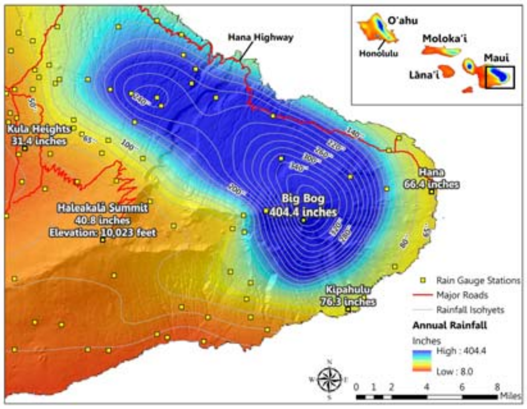
Read Write Your Own (WYO) Bulletins W-12045 and W-12079.

BW-12 also establishes an alternative effective date for flood insurance policies that were purchased on properties in the Missouri Basin between May 1, 2011, and June 6, 2011, and were impacted by the Flood in Progress exclusion. This change was implemented on October 19, 2012.

Read Write Your Own (WYO) Bulletins W-11034 and W-12080.

Agents should, as always, keep in mind the need to work with the WYO Companies to know how they are handling the specifics of these changes and how they maybe notifying their insureds.

Source:eWatermark 1/30/13



Giambelluca, T.W., Q. Chen, A.G. Fraazier, J.P. Price, Y. –L. Chen, P. –S. Chu, J.K. Eischeid, and D.M. Delparte, 2012: Online Rainfall Atlas of Hawaii . *Bull Amer. Meteor. Soc.*, doi: 10.1175/BAMS-D-11-00228.1. Courtesy Abby Frazier

UHM's online Rainfall Atlas of Hawaii offers a fantastically detailed portrait of rain patterns all across the lands. Above, a close-up of the atlas' map of east Maui, which illustrates what is officially the rainiest spot in Hawaii: Big Bog on the eastern flank of Haleakala, which sees 404.4 inches a year. (http://rainfall.geography.hawaii.edu)

of Hawai'i) experienced firsthand in 1996 offers proof: His own data have now proved that East Maui's high montane native forests, with 404 inches of rain a year, are the rainiest place in Hawai'i.

Giambelluca was the lead researcher on both the original *Rainfall Atlas of Hawai'i*, commissioned in 1986 by the state Division of Water and Land Development, and the 2011 *Rainfall Atlas of Hawai'i*—an updated web version of the paper original. The online 2011 atlas is a highly accessible resource available to everyone interested in Hawai'i's rainfall, designed to be useful to both the most sophisticated researcher and the greenest newbie.

"The atlas is not confined to scientists and academics. It is a way for everybody to understand their climate better," says graduate student Abby Frazier, who was on the eighteen-member team that worked on the atlas; she scrutinized the accuracy of data coming from rain gauges across the Islands. "Anyone can interact with this information in a way that wasn't possible before."

Try the atlas out yourself and you'll see. If you're planning to go bird-watching in Hakalau in March, the atlas will give you an idea whether you should bring rain gear. If you want to grow tropical fruit trees on Kaua'i and you're wondering which gets more rain, Kalaheo or Kîlauea, the atlas will give you an answer in seconds. If you're just a weather lover who wants to better understand rain patterns on Hawai'i's seven high islands, you have access to the most complete, up-to-date rainfall information there is. Say, for example, you're interested in Kihei. Open the atlas and click on the little green square in the Kihei region of Maui. Immediately you'll see that Kihei receives a mean annual rainfall of 10.89 inches. If you want to compare Kihei with the mountains of West Maui, click on the Kukui station: You'll see that a mere fifteen miles away, the mean annual rainfall is almost 366 inches.

University of Hawai'i associate geography professor Dr. Qi Chen was co-principal investigator, charged with fusing enormous volumes of data based on rain gauges, radar and other sources. And while the atlas contains a fascinating history of rainfall record-keeping in Hawai'i as well as a detailed explanation of the project's methodologies, its real heart is its interactive map. Users can choose from nine "base" maps that show such things as satellite imagery, topographic details, bathymetric references and surface landmarks. The maps can be overlaid with mean monthly and annual rainfall statistics and a color-coded layer that tracks rainfall over the thirty-year base period that the atlas covers (from 1978 to 2007).

Dr. Jonathan Price, an assistant professor in the UH Hilo geography department, calls the atlas "the next generation of rainfall data." Price played an important role in creating the atlas by using his knowledge of native vegetation and ecosystems to fill in the gaps for very remote areas where there are no rainfall stations or historical records. "We were able to derive a relationship that says, 'This type of vegetation requires about this amount of rainfall,'" Price explains. In the absence of data from climate stations, scientists could make an educated estimate of how much rain falls in any given area by looking at what's growing there.

"Our climate situation in Hawai'i is about as complicated as anywhere," Price says. "It's so complex that even a climate station a couple of miles away is just not good enough in some places. In two miles you can have extraordinarily different climate."

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At their peak in 1968, there were 1,030 rain gauge stations in Hawai'i. But as the sugar cane industry declined, so too did the number of monitored weather stations in the Islands, falling to about 330 today. To create the atlas, the team used measurements taken as far back as 1874, gathering information from some two thousand rain gauges that were monitored at varying times of the nineteenth and twentieth centuries. Each rain gauge station on the atlas (including current, discontinued and virtual stations) lists its name, coordinates, elevation and observer information.

Rainfall in Hawai'i, says Giambelluca, is unlike anywhere else. On the one hand, the Islands' typical tradewind weather patterns are remarkably stable. But Hawai'i, with its intensely varied geography, is also home to the world's most extreme rainfall gradients; Giambelluca calls them "continental in scale" but squeezed into an archipelago of small islands. Such variation provides for the lush Hana coast to receive an average of sixty-six inches a year while the sere Kaupo coast, just twenty miles away, receives twenty-one.

The mountains of the Hawaiian Islands function as rain catchers. If they were not here, the whole picture of rainfall in this part of the Pacific would be radically different: Giambelluca points out that Hawai'i is similar in latitude and atmospheric circulation to the Sahara desert. Without our islands, this part of the Pacific Ocean would receive just twenty-seven inches of rain per year.

"Rainfall changes over time," Giambelluca says, "going up and down." Pointing to periodic fluctuations in climate called the Pacific Decadal Oscillation, Giambelluca says that the overall amount of rainfall has decreased over the last century. Whether Hawai'i will continue to grow drier in the decades ahead is the subject of climate models. The weight of the evidence, he says, indicates continued drying with an increase in drought frequency by midcentury, especially in the already drier leeward areas. This trend, Giambelluca says, is probably not a natural fluctuation, but a result of changes associated with global warming: As changing weather patterns cause winter storms to migrate northward away from Hawai'i, less rain and more drought will result.

It's hard to overstate the importance of understanding Hawai'i's rainfall, especially for scientists examining Hawai'i's ecosystems and climate patterns. At Hawai'i Volcanoes National Park, United States Geological Survey ecologist Dr. David Foote has been using the atlas since its first paper incarnation when he was a graduate student studying fruit flies in the late 1980s. The atlas is vital, Foote says, because knowing how much rain falls and where it falls is critical to understanding the complex relationships that define Hawai'i's ecosystems. He still cherishes his dog-eared copy of the original atlas but uses the updated version for two projects studying native damselflies, which prey upon introduced mosquitoes and thereby help suppress foreign diseases the mosquitoes carry. The atlas has helped Foote and his colleagues conduct surveys along isohyets (constant lines of equal rainfall), which allow them to measure damselfly growth rates and their patterns of predation on mosquitoes. A second project examines stream flow as is relates to rainfall, which in turn helps the researchers determine the presence or absence of mosquitoes and damselflies. The insects may be small, says Foote, but they can have a tremendous impact on the health of entire ecosystems.

Dr. Peter Vitousek, an ecology professor at Stanford University, calls the atlas "an essential tool for studying how climate influences the formation and aging of soils." The atlas allows him to compare, for example, rainfall gradients on Hawai'i island with those on Kaua'i and thus to better understand how soil composition and ecosystems shift as a result of rainfall and age.

Although the atlas uses the most sophisticated modern technology available, studying Hawai'i's rainfall is nothing

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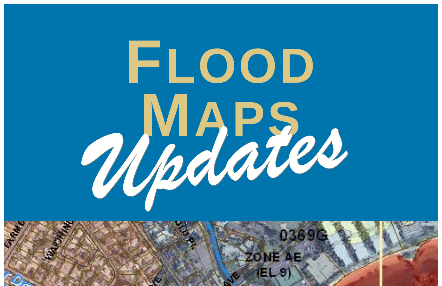


Are you currently doing work in the Counties listed here? If so, please take note that FEMA has approved the following Letter of Map Changes (LOMCs) to the flood hazard information shown on the effective Flood Insurance Rate Maps.

Kauai County
Type: LOMA
FIRM Panel 0311E
Revision Date: December 4, 2012
FEMA Case Number: 13-09-0438A
Flooding Source:
Pinau Reservoir

On-line readers can view LOMC **here**

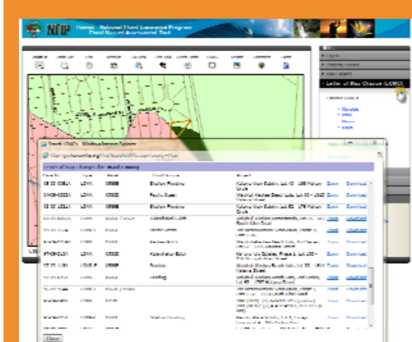
Maui County
Type: LOMA-OAS
FIRM Panel 0559F
Revision Date: December 6, 2012
FEMA Case Number: 13-09-0352A
Flooding Source:
Pacific Ocean

On-line readers can view LOMC **here**

Type: LOMA
FIRM Panel 0586F
Revision Date: December 13, 2012
FEMA Case Number: 13-09-0657A
Flooding Source:
Kulanihakoi Gulch

On-line readers can view LOMC **here**

For a complete list of Hawaii LOMCs, visit the Hawaii Flood Hazard Assessment Tool at: www.hawaiinfip.org



Floodplain Management FAQ
Condo Building - Top of Bottom Floor

Question: If a 7th floor condominium unit is being surveyed for an Elevation Certificate, should the elevation of the finish floor of that 7th floor unit be entered as item C2a (Top of Bottom Floor) on FEMA's Elevation Certificate (EC)?

Answer: NO. The first thing that must be determined is what type of building diagram best fits the type of construction of the subject condominium structure. Once that is determined, it will be clear by looking at the building diagrams on the EC instructions which elevation should be taken for item C2a on the EC.

For example, a condo unit owner in the Marina Towers Condominium in Waikiki has hired a surveyor to complete an EC for flood insurance rating purposes. Because this structure has an underground parking facility, the building diagram selected is DIAGRAM 2. Remember, a floor that is below ground level (grade) on all sides is considered a basement even if the floor is used for living purposes, or as an office, garage, workshop, etc.

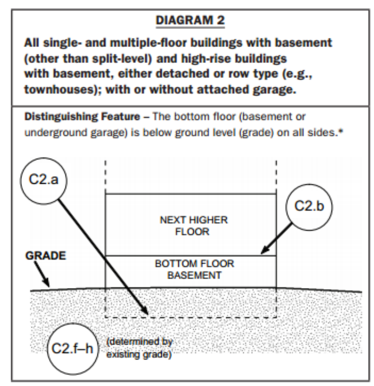
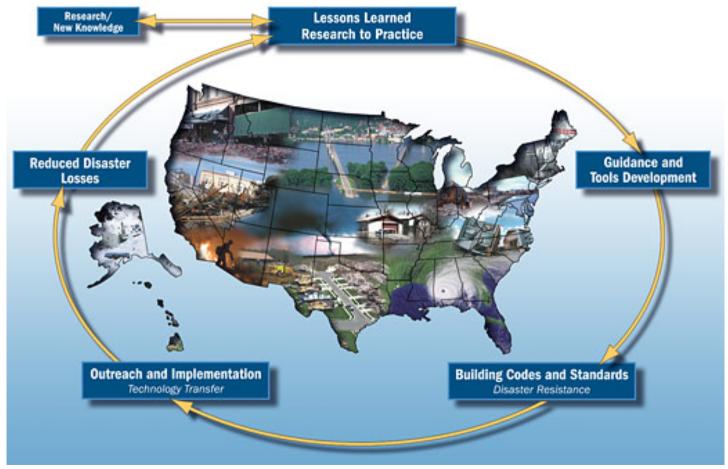


DIAGRAM 2 illustrates where item C2.a elevation should be taken: at the basement floor. If this building didn't have a basement, item C2.a would be captured in the lobby area at ground level.

FEMA Building Science Branch



Who We Are: The FEMA Building Science Branch provides technical services for the Federal Insurance and Mitigation Administration (FIMA). The branch develops and produces multi-hazard mitigation guidance that focuses on creating disaster-resilient communities to reduce loss of life and property. Building Science Branch activities include deploying Mitigation Assessment Teams to conduct post-disaster engineering investigations for both man-made and natural hazard events. Building Science takes a lead role in developing publications, guidance materials, tools, technical bulletins, and recovery advisories that incorporate the most up-to-date building codes, floodproofing requirements, seismic design standards, and wind design requirements for new construction and the repair of existing buildings. In addition to providing technical support for the development and adoption of model building codes and standards, Building Science Branch provides technical support for the National Flood Insurance Program (NFIP) for public and private sector stakeholders, the National Earthquake Hazards Reduction Program (NEHRP), the National Windstorm Impact Reduction Program (NWIRP), and pursuing outreach strategies for communicating Building Science issues.

What We Do: The Building Science branch develops mitigation guidance that focuses on creating disaster-resilient communities. Mitigation efforts provide value to the American people by creating safer communities and reducing loss of life and property. Our mitigation activities include:

- Technical services bureau for Mitigation and FEMA
- Mitigation Assessment Team (MAT) Program
- The National Earthquake Hazards Reduction Program (NEHRP)
- Developing publications, guidance materials, tools, technical bulletins, and recovery advisories that incorporate the most up-to-date building codes, floodproofing requirements, seismic design standards, and wind-bracing requirements for new construction or repairing existing buildings.
- Supporting the development and adoption of model building codes and standards
- All hazards mitigation, the Risk Management Series (RMS)
- Providing technical support for the National Flood Insurance Program (NFIP)
- Providing technical support to public and private sector stakeholders.
- Producing state of the art guidance on the construction of community and residential tornado safe rooms to help protect people in their homes, public buildings, and schools in hurricane- and tornado-prone areas.
- Pursuing outreach strategies for communicating Building Science issues to a wide array of stakeholders.

Questions?
Click on the "Frequently Asked Questions" link to view FAQs. If you need additional information contact the Building Science Helpline at (866) 927-2104 or email FEMA-Buildingsciencehelp@fema.dhs.gov**.** Please allow up to 5 business days for a response.

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Who'll Map the Rain? (Continued from Page 5)

new. Kauaʻi kalo (taro) farmer Adam Asquith, a trained biologist who farms around twenty-five acres of taro in Kapaʻa, might use the atlas to learn more about monthly rainfall averages, but generations of kalo farmers before him relied on their own methods. Kanaka maoli—the first Hawaiians—had a deep knowledge of ua (rain) and some two thousand specific names to describe a particular quality, state or location of a rain.

Dr. Puakea Nogelmeier is a professor of Hawaiian language at UH Manoa. He notes that Hawaiian rain names were poetic, historical and full of metaphor. He describes the "big rain" where he lives, in Kalihi Valley: "I've only ever seen it twice. I've read about it, and I knew it the moment I saw it. It's a rain called ka ua Poʻolipilipi o Kalihi, which means 'the sharpened-head rain of Kalihi.' It's a twenty-five-foot visibility limit rain. That's a serious rain."

With the resurgence of Hawaiian culture and language studies, Nogelmeier says, more Hawaiian rain names are being rediscovered. Over the course of what Nogelmeier calls "a hundred-year drought of knowledge" when the use of Hawaiian language was discouraged, these poetic, very specific rain names fell out of use in favor of generic terms like tradewinds and passing showers. But today students and scholars like Nogelmeier are rediscovering the beauty and importance of traditional rain names, names that represent history, culture and science. And so it is that today we know that the rain in which Giambelluca and Menard found themselves caught on Haleakala, the violent downpour that their gauges were collecting, was ka ua Kahakiki.

Locate the atlas online at rainfall.geography.hawaii.edu