



QUARTERLY UPDATE:

Implementation of Interim Instream Flow Standard (Interim IFS) for Maui Streams

East Maui Implementation

March 22-23, 2011: Commission staff downloaded stream and barometric transducer data from eight sites in east Maui on Waiohue, East Wailuaiki, West Wailuaiki, Wailuanui, Palauhulu (Photo 1), Waikamoi, Hanehoi and Honopou (Photo 2) Streams. These data retrievals are expected to be conducted on a quarterly basis. Two malfunctioning field cameras were also retrieved from Palauhulu and Wailuanui Streams likely due to water damage from very high streamflows or intense rainfall events.



Photo 1. A ladder is used to retrieve the transducer on Palauhulu Stream.



Photo 2. Staff retrieves the transducer from a swollen Honopou Stream.

April 26-27, 2011: Staff conducted field investigations with staff from the Division of Aquatic Resources (DAR) and East Maui Irrigation Company (EMI) to discuss and agree upon specific diversion modifications to achieve biological connectivity for the native stream macrofauna. The diversion modifications discussed included the following:

- Hanawi Stream at Koolau Ditch Intake: Two 6 in. PVC pipes on the right bank of the diversion structure convey water from other (i.e., spring/seep) sources. These sources are considered minor diversions not directly from Hanawi Stream. EMI plans to extend one of the existing pipes with elbows and short sections of pipe secured along the sluice gate structure to drop water onto the top of the diversion dam (Photo 3).
- Waiohue Stream at Koolau Ditch Intake: EMI plans to construct a pipe along one of the stream banks starting from atop the waterfall to drop water onto the top of the diversion dam (Photo 4). The pipe installation initially discussed in the field was the right bank.

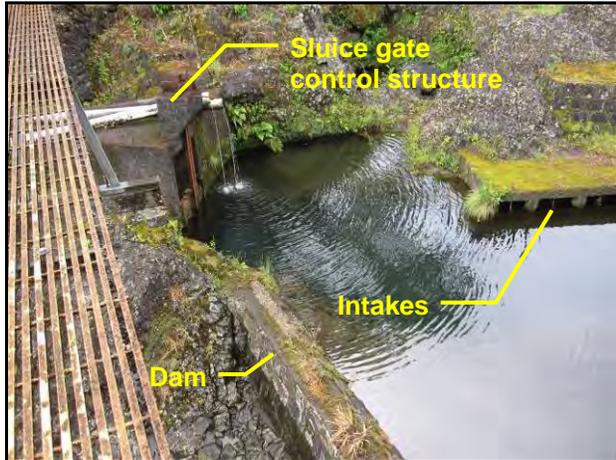


Photo 3. View of Hanawi Stream diversion intake from the left bank



Photo 4. View of Waiohue Stream diversion intake from the left bank.

- East Wailuaiki Stream at Koolau Ditch Intake: EMI plans to install a pipe along the right bank of the stream starting from a section of stream higher in elevation than the height of the diversion dam (Photo 5). Water from the pipe will be dropped onto the top of the diversion dam approximately 5 ft. from the right bank of the stream.
- West Wailuaiki Stream at Koolau Ditch Intake: EMI plans to install a pipe along the left bank of West Wailuaiki Stream from atop the waterfall and drop water onto the top of the diversion dam nearest the left bank (Photo 6).



Photo 5. Upstream view of East Wailuaiki Stream with diversion dam on the right bank and the sluice gate/intake structure on the right bank.

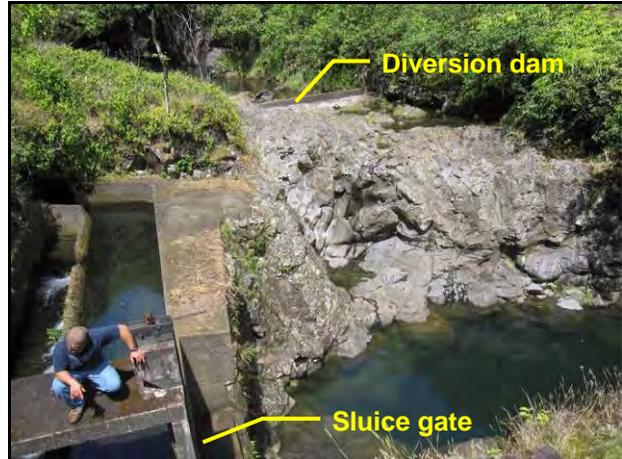


Photo 6. Upstream view of West Wailuaiki Stream with diversion dam on the left bank and and sluice gate/intake structure on the right bank.

- Honopou Stream at Haiku Ditch Diversion Intake: EMI plans to use cement to construct a small channel in the diversion intake structure where there is currently an opening nearest the right bank of the stream (Photo 7). The concrete berm on the upstream end of the channel will also be chipped away to allow water to flow downstream in the channel. The channel should be kept fairly rough. EMI will also construct a small concrete berm near at the base of the water drop from the low-flow bypass channel to prevent water from flowing back into the Haiku Ditch.
- Honopou Stream at Wailoa Ditch Diversion Intake: EMI plans to fill the first intake grate section (from the right bank) with cement, and leave the concrete slightly depressed to allow the section to fill with water and pool (Photo 8). Upon filling, the section would be expected to overflow down the intake apron to provide a wetted face for connectivity.



Photo 7. Downstream view of the Haiku Ditch diversion intake on Honopou Stream from the right bank.



Photo 8. Upstream view towards the right bank of the Wailoa Ditch intake grate on Honopou Stream.

June 14, 2011: Staff conducted quarterly data retrieval of stream and barometric transducer data.

September 2011: The U.S. Geological Survey notified staff that the fieldwork phase of the East Maui Irrigation Diversion System Seepage Reconnaissance Study was complete. This study is a 1.5-year study to assess, at the reconnaissance level, the amount of seepage into or from the four main ditches in the EMI system by documenting seepage rates for various construction-type sections of the ditches. Published results of the study are expected September 2012.

September 27-28, 2011: Staff conducted quarterly data retrieval of stream and barometric transducer data. This trip also included streamflow measurements taken at Wailuanui, Palauhulu, Hanehoi, and Honopou.

September 28, 2011: Staff met with Makapipi residents to update them on the implementation of interim instream flow standards in east Maui and to review the summary of discharge measurements completed by USGS during September 13-17, 2010. Issues raised by the residents included questions about area wells and their impact on streamflow and coordination with EMI to access and view the Makapipi Stream diversions. Staff is currently researching these issues and will continue to communicate and work with the Makapipi residents.

November 2, 2011: Staff conducted a follow-up field investigation with staff from DAR and EMI to review the completed diversion modifications and propose any revisions if needed (Photos 9-20). Staff also documented the wet season releases for Waiohue, East Wailuaiki, West Wailuaiki, and Waikamoi Streams (See Table 1, with wet season interim IFS values shaded gray).

Table 1. Downstream view of the Haiku Ditch diversion intake on Honopou Stream from the right bank.

	Interim IFS Amounts				Restoration Amounts				Altitude feet
	Wet Season		Dry Season		Wet Season		Dry Season		
	<i>cfs</i>	<i>mgd</i>	<i>cfs</i>	<i>mgd</i>	<i>cfs</i>	<i>mgd</i>	<i>cfs</i>	<i>mgd</i>	
Waikamoi	2.80	1.81	0	0	2.60	1.68	0	0	550
West Wailuaiki	3.80	2.46	0.40	0.26	3.80	2.46	0.40	0.26	1,235
East Wailuaiki	3.70	2.39	0.20	0.13	3.70	2.39	0.20	0.13	1,235
Waiohue	3.20	2.07	0.10	0.06	3.2	2.07	0.10	0.06	1,195



Photo 9. Completed diversion modification on Hanawi Stream.



Photo 10. Close-up of water spilling onto the Hanawi diversion dam structure.



Photo 11. Completed diversion modification on Waiohue Stream conveys water via HDPE pipe from an upstream reach.



Photo 12. HC&S implementing the wet season release for Waiohue Stream.



Photo 13. Completed diversion modification on East Wailuaiki Stream conveys water via HDPE pipe from an upstream reach.



Photo 14. HC&S implementing the wet season release for East Wailuaiki Stream.



Photo 15. Completed diversion modification on West Wailuaiki Stream conveys water via HDPE pipe from an upstream reach.



Photo 16. HC&S implementing the wet season release for West Wailuaiki Stream



Photo 17. Spacers were used to set the bolt for the sluice gate at a specific height to achieve the desired flow release on Waikamoi Stream.



Photo 18. Bypass flow at the sluice gate on Waikamoi Stream. Gate heights were calculated ahead of time based on the sluice gate dimensions.



Photo 19. EMI constructed a concrete ramp and channel along the right bank of Honopou Stream to provide for connectivity.



Photo 20. A concrete berm was constructed beneath the bypass channel to prevent water from spilling back into Haiku Ditch on Honopou Stream.



Na Wai Eha Implementation

March 21, 2011: Commission staff downloaded stream and barometric transducer data from three sites in Na Wai Eha on Waihee River, Waiehu Stream below the confluence, and at the Spreckels Side Ditch on South Waiehu Stream. These data retrievals are expected to be conducted on a quarterly basis. Staff made a stream flow measurement as part of the rating curve development at the Spreckels Ditch site.

Staff conducted a brief assessment of North Waiehu Stream by walking upstream from just above the confluence of the North and South forks. Much of the stream, starting from approximately 2,000 feet above the confluence, was dry for long stretches. Further investigations will need to be conducted to better determine the hydrologic conditions of North Waiehu Stream. This matter is complicated by changes in ownership of land encompassing North Waiehu Stream, the presence of squatters on the property, and reports of vandalism to the Wailuku Water Company (WWC) intakes. Staff will continue to monitor the situation and further investigate when appropriate.

April 25, 2011: Staff conducted field investigations with staff from the DAR, WWC, and Hawaiian Commercial & Sugar Company (HC&S) to discuss and agree upon specific diversion modifications to achieve biological connectivity for the native stream macrofauna. The diversion modifications discussed included the following:

- Waihee River at Waihee Ditch South Fork Intake: WWC will keep the existing iron 'H' beam channel installed across the intake grates in place. Plywood will be placed temporarily over the intake grating adjacent to the left bank wing wall to provide flow connectivity nearest the left bank. A permanent steel plate will be installed to replace the plywood once a suitable shape and size is determined (Photo 21). No actions will be taken for the Waihee Ditch North Fork Intake.
- Waihee River at Spreckels Ditch Intake: WWC plans to install an iron 'H' beam channel along the left bank wing wall of the diversion dam. The upstream end of the channel will be installed in a small pool approximately 10 ft. upstream of the dam (Photo 22). The downstream end of the channel will drop water atop the diversion dam nearest the left bank. An eroded portion of the concrete apron downstream of the bypass channel will be repaired.



Photo 21. View of Waihee River Waihee Ditch South Fork intake facing the left bank and the existing iron 'H' beam bypass in the foreground.



Photo 22. Upstream view of Waihee River towards the right bank with the diversion dam in the foreground.

- South Waiehu Stream at Spreckels Ditch Intake: HC&S is in the planning process to fix the eroded section of the concrete apron of the downstream face of the diversion structure. DAR and HC&S



have agreed to postpone actions to address biological connectivity for this diversion until the concrete apron is fixed and issues pertaining to the interim instream flow standards are addressed (Photos 23-24). HC&S has received permission from the landowner adjacent to the diversion and expects to complete repairs to the concrete apron by the end of the year.

- Waihee River at Spreckels Ditch Intake: WWC plans to install an iron 'H' beam channel along the left bank wing wall of the diversion dam. The upstream end of the channel will be installed in a small pool approximately 10 ft. upstream of the dam. The downstream end of the channel will drop water atop the diversion dam nearest the left bank. An eroded portion of the concrete apron downstream of the bypass channel will be repaired.



Photo 23. Diversion Intake structure to Spreckels Ditch on the right bank of the South Waiehu Stream.



Photo 24. Downstream view of the eroded concrete apron on the South Waiehu diversion intake to Spreckels Ditch

- Iao Stream at Spreckels Ditch Intake: HC&S will clean a portion of the debris on the north side of the intake grates to create a pool where the biota can hold up (wait) and survive as they migrate upstream (Photo 25). HC&S will need to coordinate with the County of Maui and determine whether permits are needed for such actions.
- Iao Stream at Iao-Maniania Ditch Intake: WWC will install an iron 'H' beam channel at the point where the intake grate edge sections meet nearest the right bank of Iao Stream (Photo 26).



Photo 25. Cobble/boulder sediment collects around the diversion intake for Spreckels Ditch on the right bank of Iao Stream.



Photo 26. View of the Iao-Maniania Ditch intake grates looking towards the right bank of Iao Stream.



- **Waikapu Stream at Waihee Ditch Intake:** A portion of the concrete dam near the middle of the diversion structure will be chipped away to create a small channel towards the right bank side of the intake grates (Photo 27). The iron 'H' beam channel currently installed across the intake grates will remain in place; however, DAR has suggested that slower velocity and shallower flow across the concrete apron will promote biota migration.
- **Waikapu Stream at Reservoir 6 Intake:** The upstream berm of the diversion intake grates will be repaired with concrete to raise the water level (Photo 28). WWC will install an iron 'H' beam channel across the width of the intake grates. The eroded section in the concrete apron downstream of the intake will be left as is, but may be repaired if connectivity is not established after the bypass channel is installed.



Photo 27. Diversion Intake structure to Waihee Ditch facing towards the right bank on Waikapu Stream.



Photo 28. Reservoir 6 diversion intake grate across the stream channel, facing towards the right bank on Waikapu Stream.

June 14, 2011: Staff conducted quarterly data retrieval of stream and barometric transducer data.

August 11, 2011: Staff made a stream flow measurement as part of the rating curve development at the Spreckels Ditch site.

September 26, 2011: Staff conducted quarterly data retrieval of stream and barometric transducer data.

October 19, 2011: Staff installed a stream transducer on the lower Waihee River interim IFS site at Kahekili Hwy.

November 1, 2011: Staff conducted a follow-up field investigation with staff from DAR, WWC, and HC&S to review the completed diversion modifications and propose any revisions if needed (Photos 29-33). DAR staff has asked for a few more minor modifications to be made by WWC at the Spreckles Ditch Intake on Waihee River, Iao-Maniania Ditch Intake on Iao Stream, and the Waihee Ditch Intake on Waikapu Stream. Commission staff will continue to coordinate with DAR, WWC, and HC&S on these matters.



Photo 29. Completed modification at Waihee Ditch intake on Waihee River.



Photo 30. Completed modification at Spreckels Ditch intake on Waihee River.



Photo 31. Completed modification at lao-Maniania Ditch intake on lao Stream.



Photo 32. Completed modification at Spreckels Ditch intake on lao Stream.



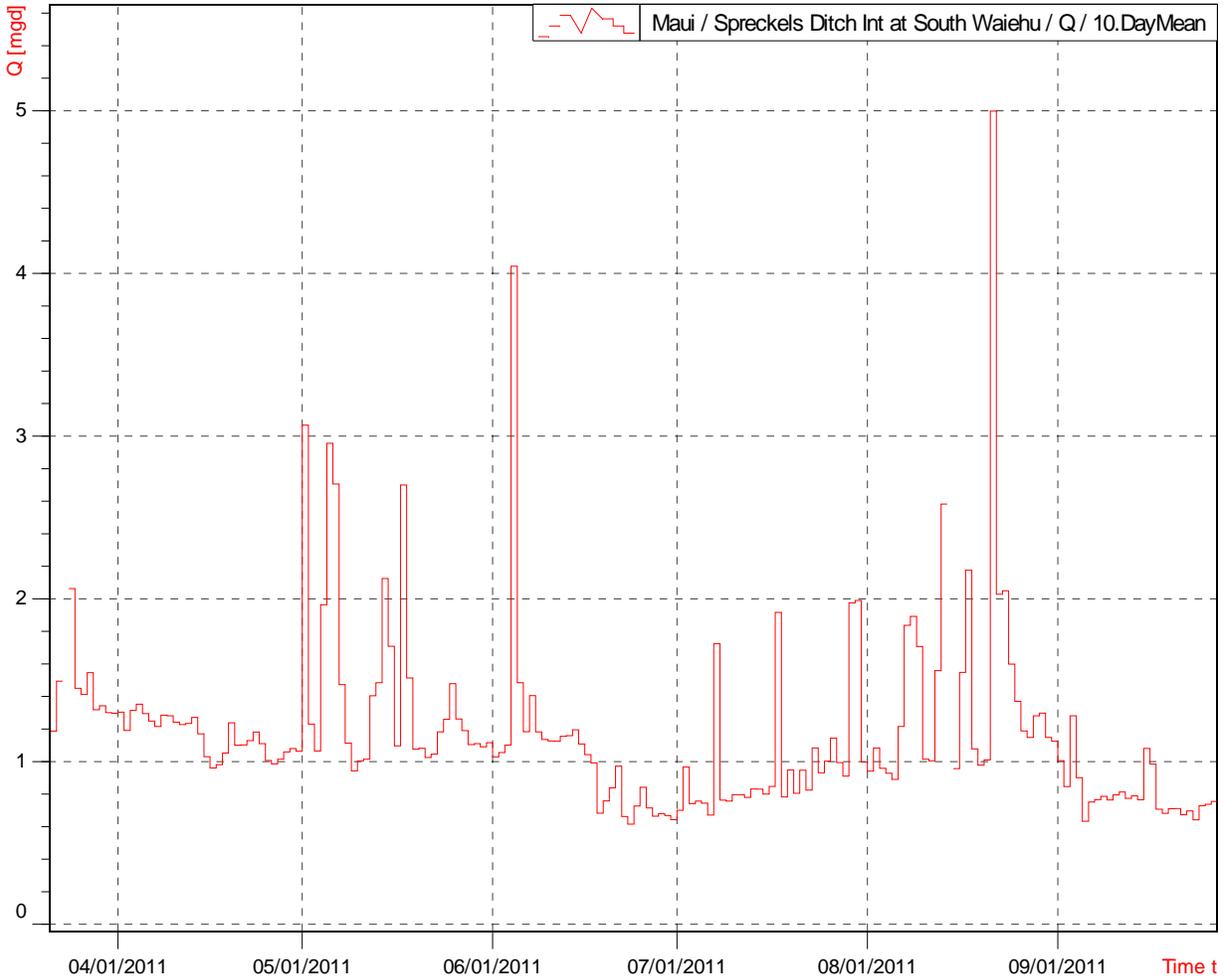
Photo 33. Completed modification at Waihee Ditch intake on Waikapu Stream.



Photo 34. Completed modification at Reservoir 6 intake on Waikapu Stream.



Preliminary information on South Waiehu Ditch: The graph below depicts daily mean flow values in the Spreckels Side Ditch on South Waiehu Stream over the past 190 days (03/21/2011 to 09/26/2011).



Future Actions:

- Staff will continue working with USGS on the completion of the rating curves and data transfer for east Maui and Na Wai Eha staff gages.
- Staff will continue working with Kisters on the implementation of WISKI (time-series data management software) and the management of field data, refinement of the rating curves, and computation of various streamflow statistics.