



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
 Stream Protection and Management Branch

FIELD INVESTIGATION REPORT

FI2008121002 (East Maui, East Wailuanui Koolau Ditch)

| | | | |
|-------------------------------------|---|------------------------|-------------|
| Date of Field Investigation: | December 10, 2008 | Time (24-hour): | 1030 - 1120 |
| CWRM Staff: | Ken Kawahara, Ed Sakoda, Dean Uyeno, and Chui Ling Cheng | | |
| Individuals Present: | Amanda Martin (President of Na Moku); EMI - Garret Hew (Water Resources Manager), Mark Vaught (Operations Manager), Henry Robello (Field Superintendent); DOCARE officers | | |
| Hydrologic Unit: | Wailuanui (6056) | | |
| Stream Name: | East Wailuanui Tributary | | |

Findings:

At 1030 hours, CWRM staff arrived at the Koolau Ditch bypass sluice gate on East Wailuanui tributary. The purpose of this field visit was to document the adjustment of the sluice gate. Following the adoption of IIFS, EMI had expressed interest in lowering the sluice gate so that the ditch could capture high flows during high rainfall events. CWRM staff was present to ensure that the height of the sluice gate opening after adjustment would allow enough flow to pass through, and satisfy the IIFS at the selected site further downstream on Wailuanui Stream. In other words, no water from the stream is diverted unless the IIFS is met.

CWRM staff measured the dimensions of the sluice gate opening to be 3.0 x 2.0 feet (W x H). The depth of water at the sluice gate was 0.11 feet, which was 0.015 feet lower than the water depth recorded on Monday, Dec. 8, 2008 (refer to FI2008120801). Staff also measured the gap between each notch on the sluice gate adjustment structure to be 0.18 feet.

Staff took flow measurements about 15 feet downstream of the sluice gate. This site was selected on Monday, Dec. 8, 2008 (refer to FI2008120801). The site was not flagged because this location was not intended to be an IIFS site. Flow measurement was completed in 20 minutes. Staff also recorded air temperature, water temperature and weather conditions. As computed back in the Honolulu Office, the flow was 0.921 cubic feet per second (0.595 million gallons per day), with no gage height readings. The flow was 0.146 cubic feet per second (0.944 million gallons per day) lower than the discharge recorded on Monday, Dec. 8, 2008.

The recorded flow measurement is an estimate of the discharge in East Wailuanui tributary. Staff compared this flow with the discharge in West Wailuanui tributary (refer to FI2008121003) and that at the IIFS Site on Wailuanui Stream (refer to FI2008121001) to assess flow gains or losses in the stream reach between Koolau Ditch and the IIFS Site. This is discussed in Field Investigation Report FI2008121001 (East Maui, Wailuanui IIFS Site).

Based on Field Investigation Report FI2008121001, the discharge at the IIFS Site on Wailuanui Stream was 2.076 cubic feet per second (1.342 million gallons per day). Since the adopted IIFS of 3.05 cubic feet per second (1.97 million gallons per day) was not attained, no water from the stream can be diverted. However, the sluice gate can be lowered to a height that during average flow conditions, so that enough flow passes the sluice gate to satisfy the IIFS at the selected site further downstream on Wailuanui Stream. The height of the opening was estimated by 1) calculating the flow velocity at the sluice using the discharge measured 15 feet downstream from the sluice gate;

$$\begin{matrix} \text{Flow at E. Wailuanui} & \div & (& \text{Depth of water} & \times & \text{Width of sluice gate} &) & = & \text{Flow velocity} \\ 0.921 \text{ CFS} & \div & (& 0.11 \text{ feet} & \times & 3 \text{ feet} &) & = & 2.79 \text{ feet / sec} \end{matrix}$$

and 2) calculating the discharge in E. Wailuanui using increments of the notch gap on the sluice gate adjustment structure.

$$\begin{matrix} \text{Flow velocity} & \times & (& \text{Height of sluice gate} & \times & \text{Width of sluice gate} &) & = & \text{Flow at E. Wailuanui} \\ 2.79 \text{ feet / sec} & \times & (& 0.18 \text{ feet} & \times & 3 \text{ feet} &) & = & 1.51 \text{ CFS} \\ 2.79 \text{ feet / sec} & \times & (& 0.36 \text{ feet} & \times & 3 \text{ feet} &) & = & 3.01 \text{ CFS} \end{matrix}$$

As previously measured, each notch is 0.18 feet. If the sluice gate was opened to a height of 0.18 feet, only 1.51 cubic

feet per second of flow would pass the sluice gate. Not accounting for the possibility of flow gains below Koolau Ditch and head build-up behind the sluice gate during higher flows that may increase flow velocity, opening the sluice gate to a height of 0.36 feet (2 notches) was a more conservative approach.

The final height of the sluice gate opening after adjustment was 0.35 feet. CWRM staff fluorescent yellow flagging tape to mark the height of the sluice gate opening.

Staff left East Wailuanui tributary at approximately 1120 hours, and proceeded to West Wailuanui tributary. Refer to Field Investigation Report FI2008121003 (East Maui, West Wailuanui Koolau Ditch) for more information.

Image Listing: (Attach PDF of image contact sheet)

| <u>File Name:</u> | <u>Brief Description:</u> |
|-------------------|---|
| 20081210001 | Downstream side of the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |
| 20081210002 | Downstream side of the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |
| 20081210003 | East Wailuanui Stream downstream of the Koolau Ditch bypass sluice gate. |
| 20081210005 | Upstream side of the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |
| 20081210006 | Ken Kawahara, Amanda Martin, Dexter Tom, and Mark Vaught at the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |
| 20081210008 | EMI staff adjusting the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |
| 20081210011 | CWRM staff measuring the height of the Koolau Ditch bypass sluice gate opening on East Wailuanui Stream. |
| 20081210012 | Upstream side of the Koolau Ditch bypass sluice gate on East Wailuanui Stream after gate adjustment. |
| 20081210013 | East Wailuanui Stream downstream of the Koolau Ditch bypass sluice gate after adjustment. |
| 20081210014 | Upstream side of the Koolau Ditch bypass sluice gate on East Wailuanui Stream after gate adjustment. |
| 20081210016 | Notches of the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |
| 20081210020 | Notches of the Koolau Ditch bypass sluice gate on East Wailuanui Stream. |

GPS Listing:

Shapefiles: (List file names of all shapefiles created and a brief description of each)

| <u>File Name:</u> | <u>Brief Description:</u> |
|-------------------|---|
| East_Maui_POI.shp | Points of interest (POI) recorded with the GPS unit during the field visit. The file includes POI recorded from all the East Maui field investigations. |

Waypoints: (List all waypoints in decimal degrees and provide a brief description of each)

| <u>WP No.</u> | <u>Latitude</u> | <u>Longitude</u> | <u>Brief Description:</u> |
|---------------|-----------------|------------------|--|
| 74 | 20.820689 | -156.140675 | Flow measurement site on East Wailuanui Stream below Koolau Ditch intake |

Attachments:

Brief Description:

1. Image Contact Sheet
2. Discharge Measurement and Gage Inspection Notes

Recommendations:

IMAGE CONTACT SHEET



20081210001.JPG



20081210002.JPG



20081210003.JPG



20081210005.JPG



20081210006.JPG



20081210008.JPG



20081210011.JPG



20081210012.JPG



20081210013.JPG



20081210014.JPG



20081210016.JPG



20081210020.JPG

