Commission Meeting
Haiku Community Center
September 24, 2008

Staff Presentation on the

Petition to Amend the Interim Instream Flow Standards for the Surface Water Hydrologic Units of

Honopou (6034), Hanehoi (6037), Piinaau (6053), Waiokamilo (6055), and Wailuanui (6056), Maui

State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management

Petition to Amend IIFS

HONOPOU

- Honopou Stream

HANEHOI

- Hanehoi and Puolua Streams

PIINAAU

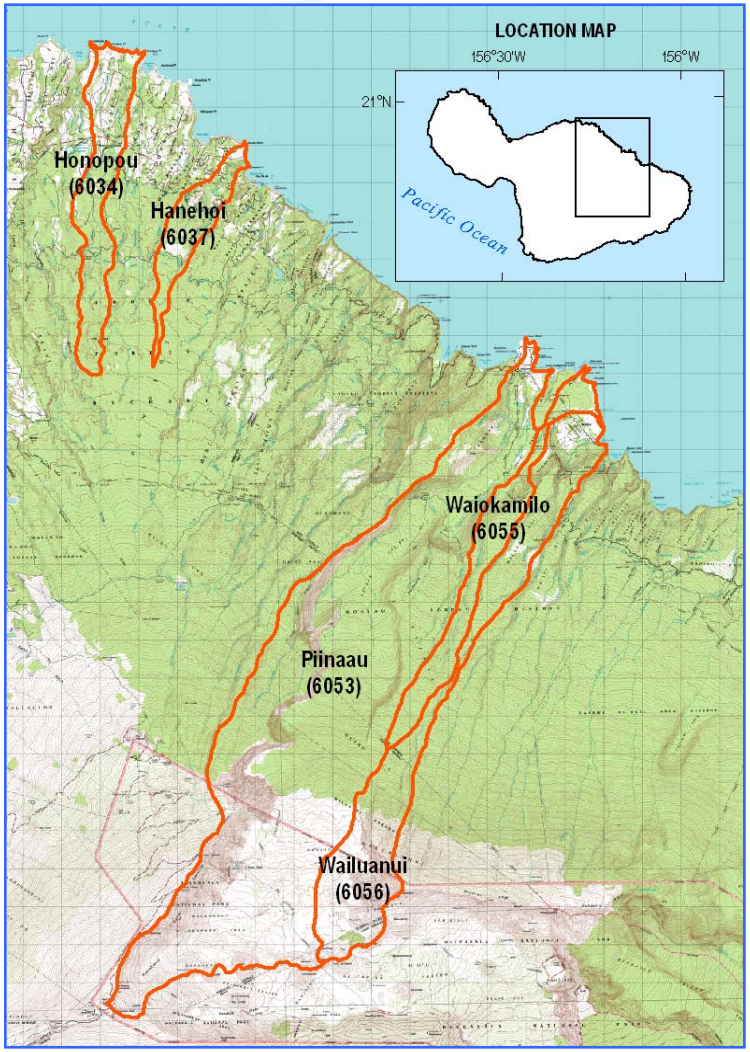
- Piinaau Stream
- Palauhulu Stream

WAIOKAMILO

- Waiokamilo Stream
- Kualani Stream

WAILUANUI

- East and West Wailuanui Streams
- Waikani Waterfall [Stream]



Presentation Overview

- **Background**
  - Timeline
  - Interim IFS process
  - Adaptive Management
  - Hydrology
- **Issues and Analysis**
  - General Considerations
  - Hydrologic Unit-Specific Considerations

Presentation Overview

- **Background**
  - **Timeline**
  - Interim IFS process
  - Adaptive Management
  - Hydrology
- **Issues and Analysis**
  - General Considerations
  - Hydrologic Unit-Specific Considerations

Timeline

- **October 8, 1988**
  - Initial “status quo” interim IFS for East Maui streams
- **May 24, 2001**
  - NHLC filed 27 Petitions to Amend the Interim IFS
- **July 23, 2001**
  - Focus on 5 hydrologic units, 8 petitions
- **March 20, 2002**
  - Commission approved Water Resource Investigations for Northeast Maui Streams

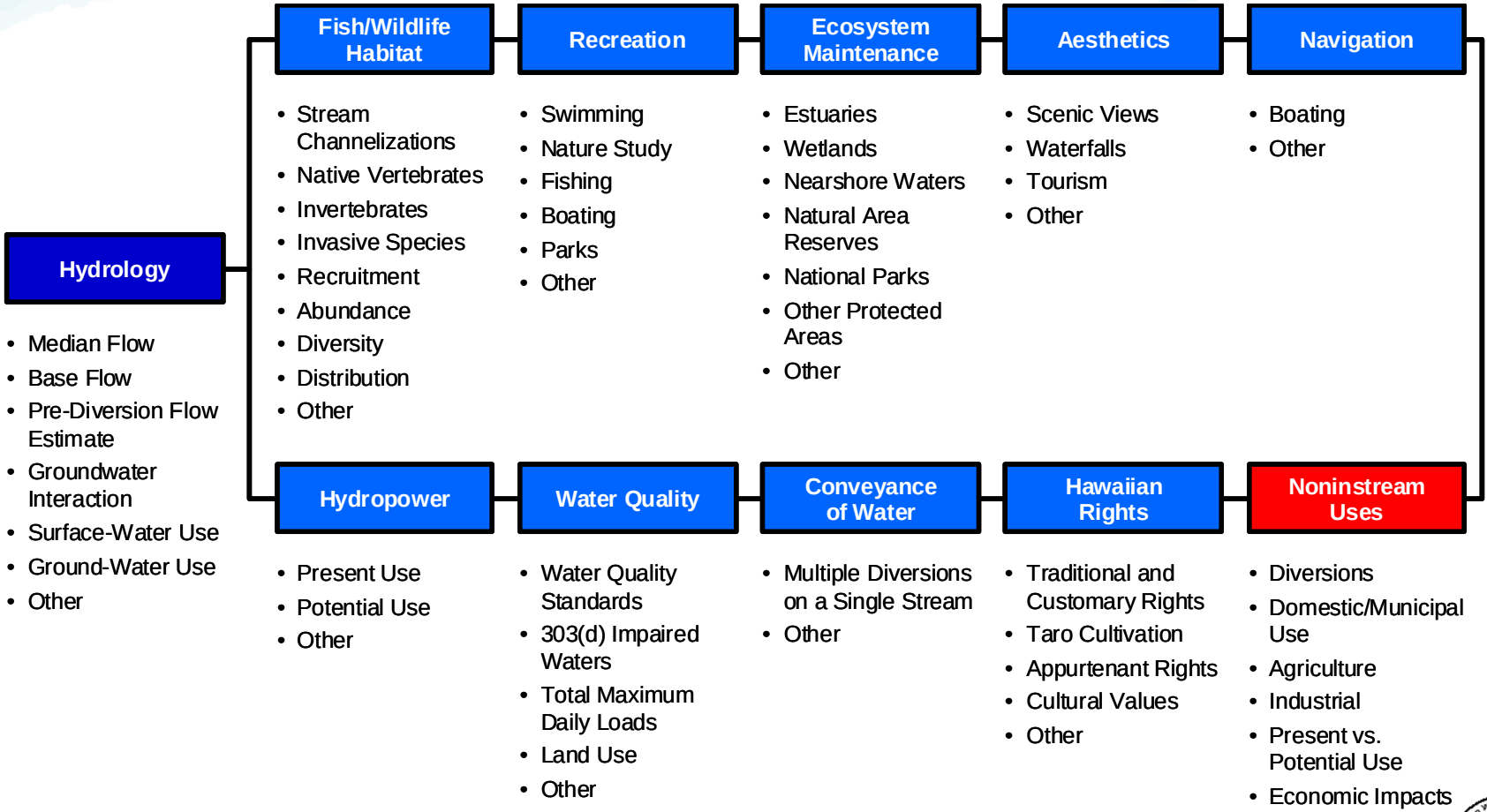
Timeline

- **June 15, 2005**
  - USGS Report: Median and Low-Flow Characteristics for Streams Under Natural and Diverted Conditions, Northeast Maui, Hawaii
- **January 2006**
  - USGS Report: Effects of Surface-Water Diversions on Habitat Availability for Native Macrofauna, Northeast Maui, Hawaii
- **December 13, 2006**
  - Approval of Interim IFS process
- **April 10, 2008**
  - Public fact gathering meeting
- **September 2 & 3, 2008**
  - Commission site visits

Presentation Overview

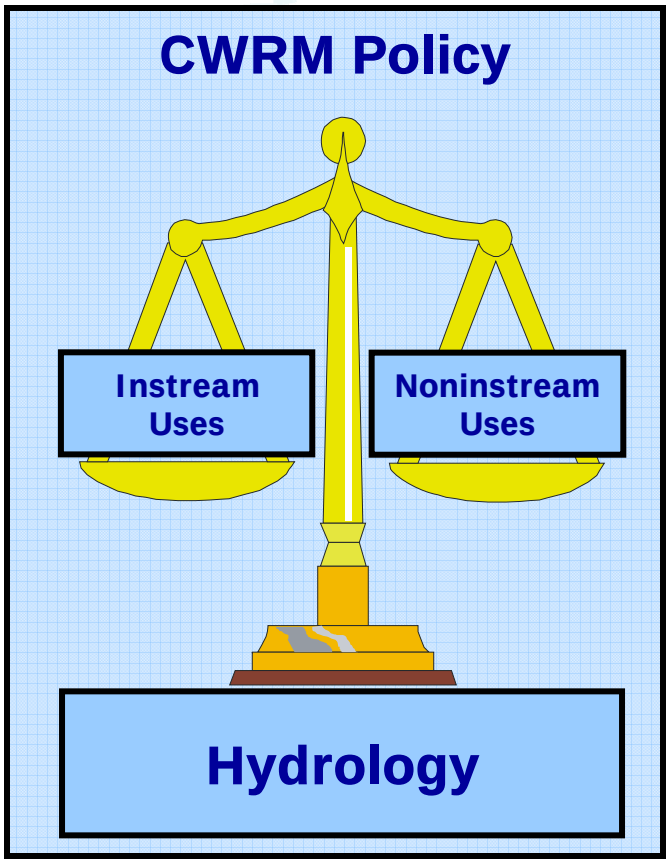
- **Background**
  - Timeline
  - **Interim IFS process**
  - Adaptive Management
  - Hydrology
- **Issues and Analysis**
  - General Considerations
  - Hydrologic Unit-Specific Considerations

Balancing the Needs

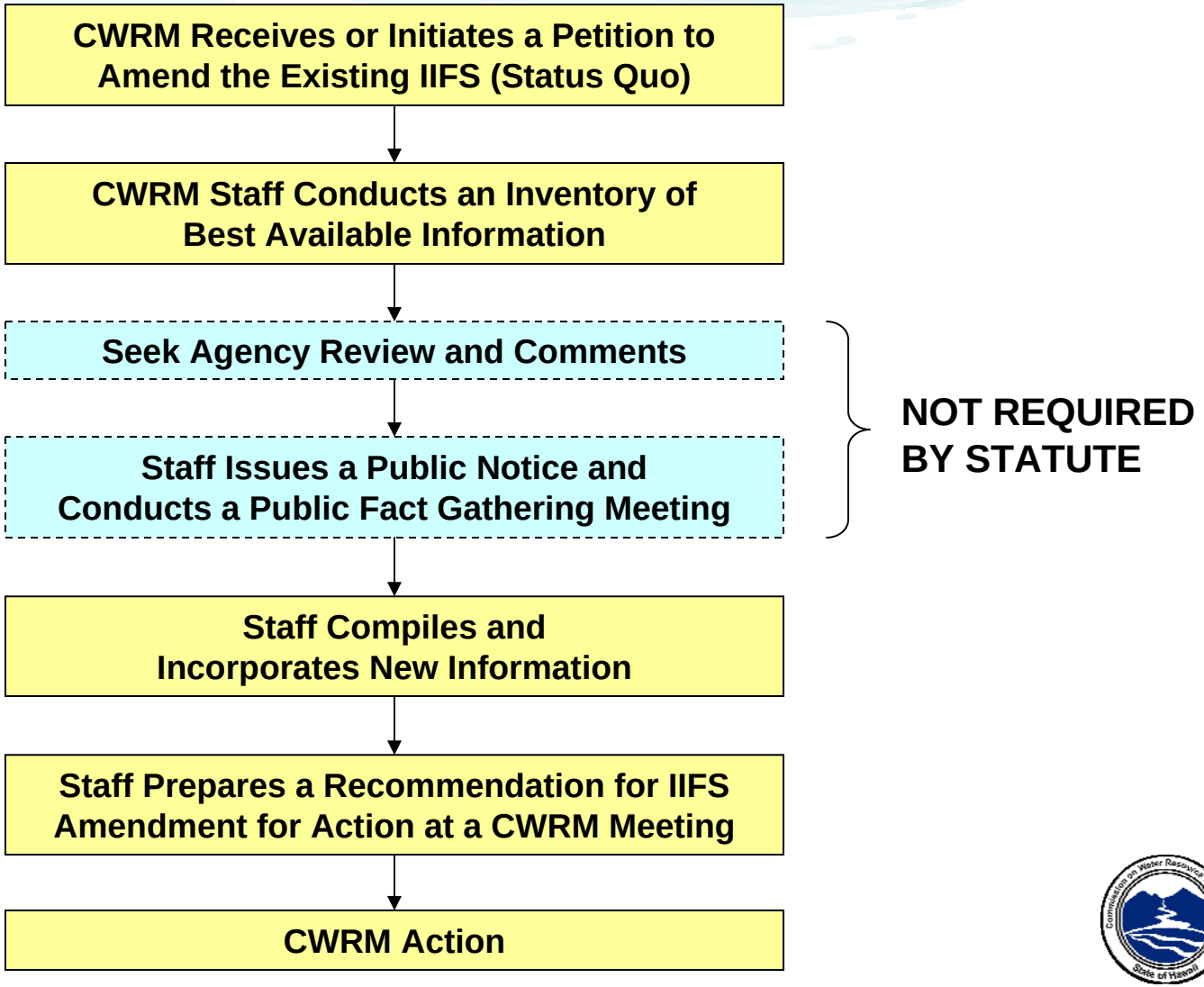


State Water Code

"The Commission shall weigh the importance of the present or potential instream values with the importance of present or potential uses of water for noninstream purposes, including the economic impact of restricting such uses."



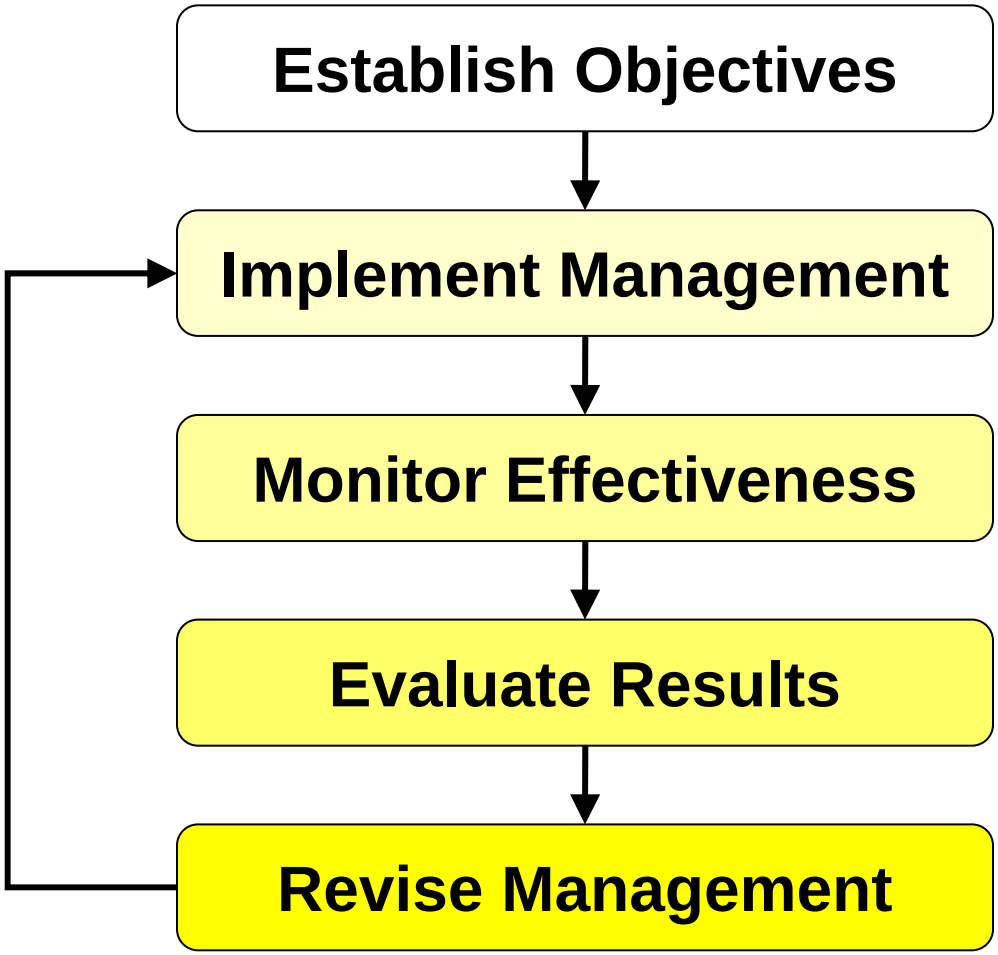
Interim IFS Process



Presentation Overview

- **Background**
  - Timeline
  - Interim IFS process
  - **Adaptive Management**
  - Hydrology
- **Issues and Analysis**
  - General Considerations
  - Hydrologic Unit-Specific Considerations

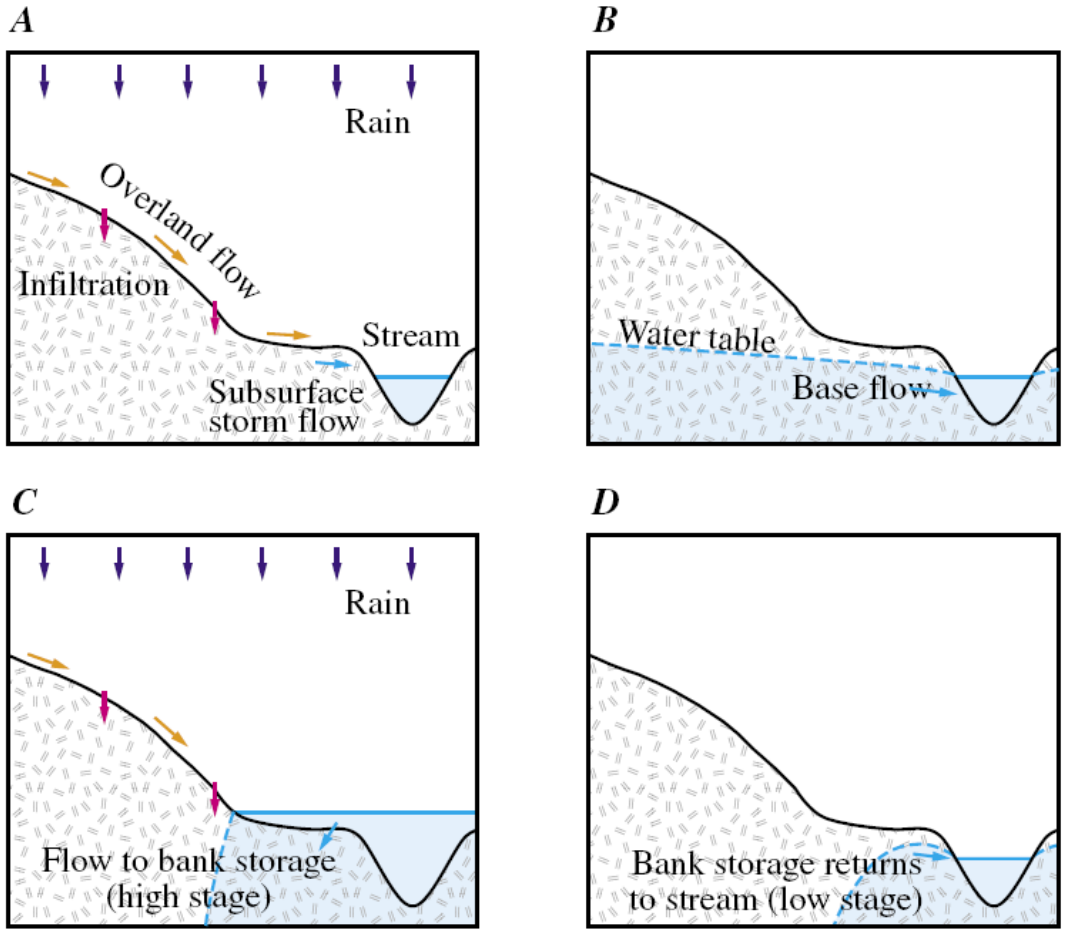
Adaptive Management



Presentation Overview

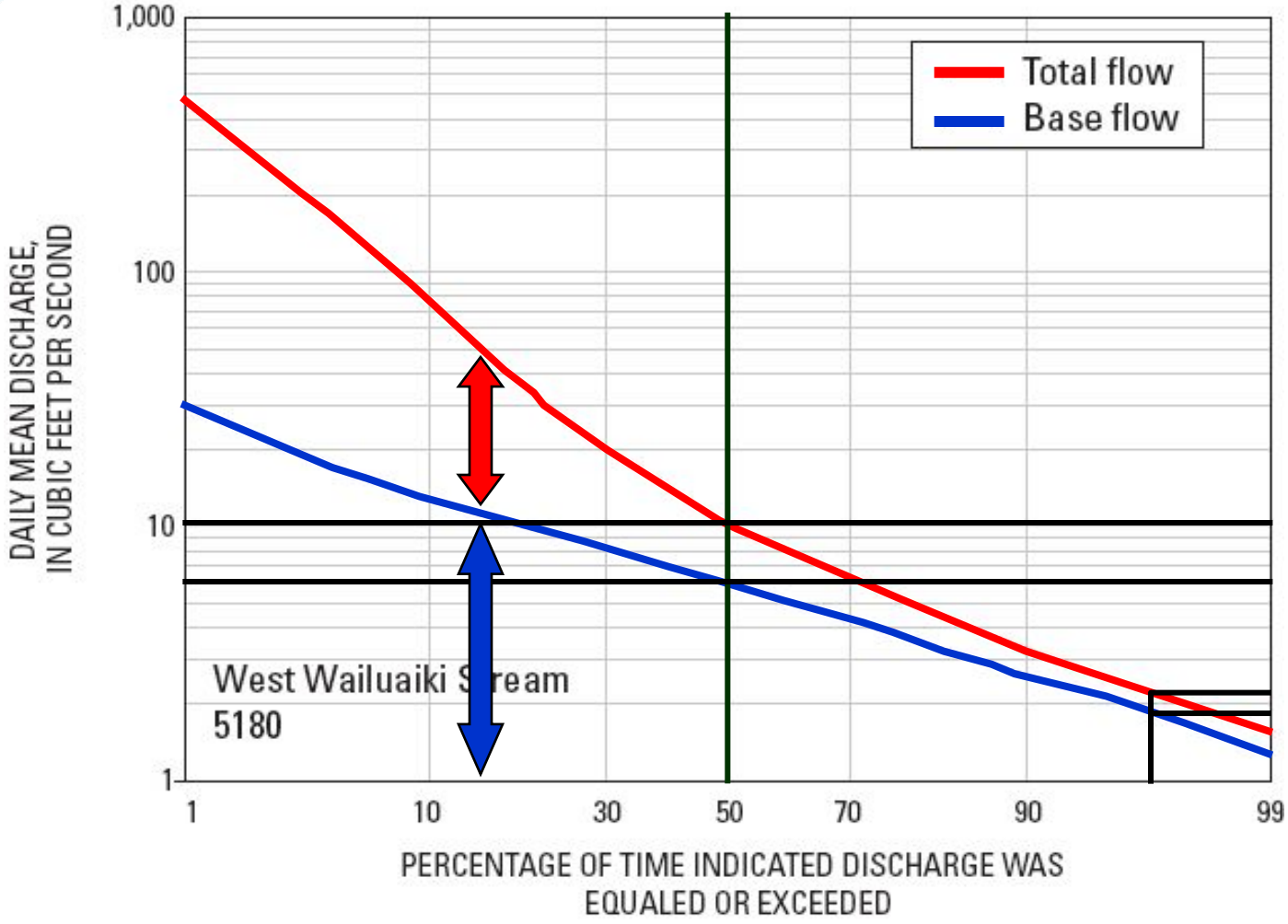
- **Background**
  - Timeline
  - Interim IFS process
  - Adaptive Management
  - **Hydrology**
- **Issues and Analysis**
  - General Considerations
  - Hydrologic Unit-Specific Considerations

Hydrology



Source: USGS

Hydrology



TFQ_{50}= 10 cfs

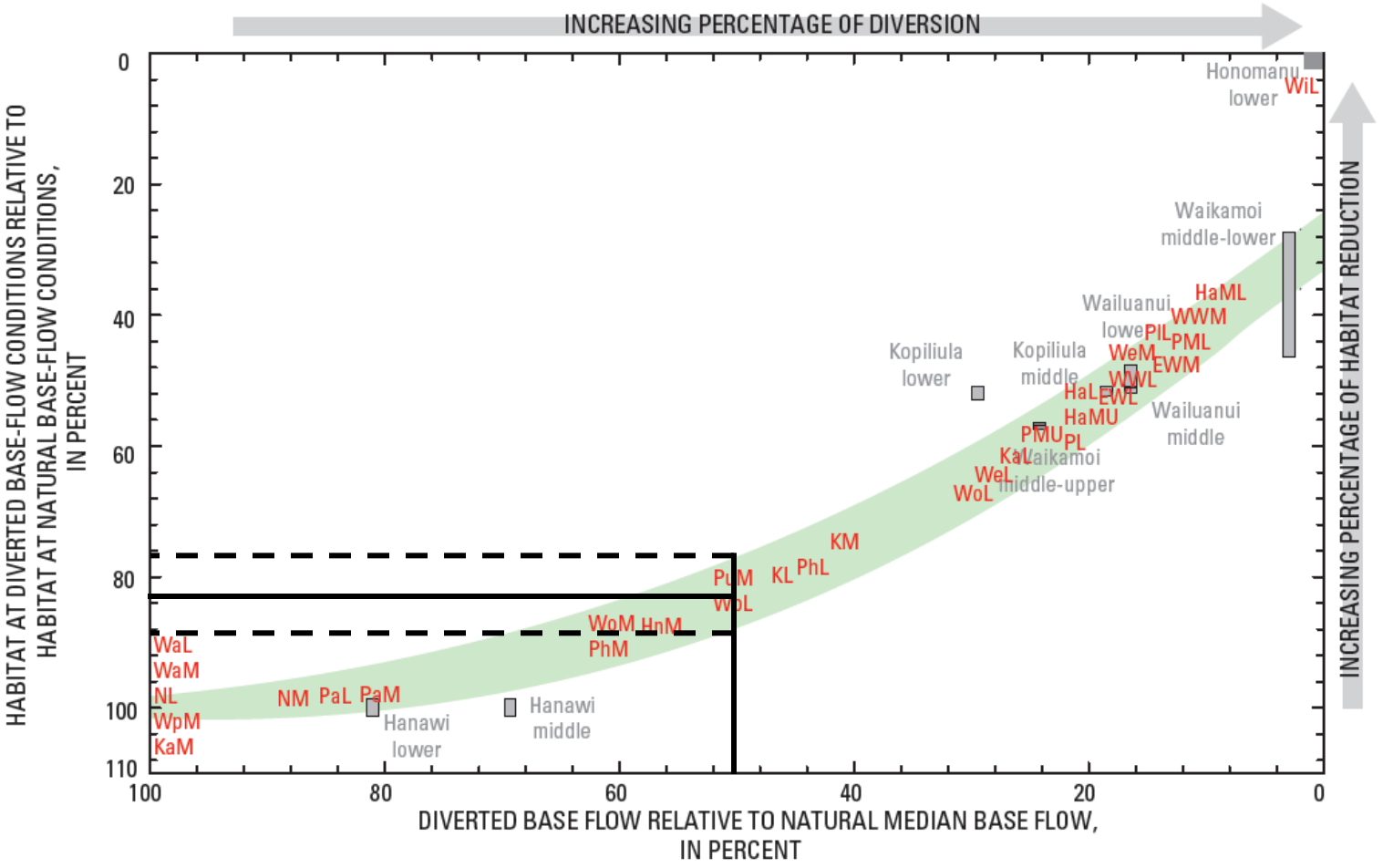
BFQ_{50}= 6 cfs

TFQ_{95}= 1.2 cfs

BFQ_{95}= 0.9 cfs

Source: USGS

Habitat Availability



Source: USGS

Presentation Overview

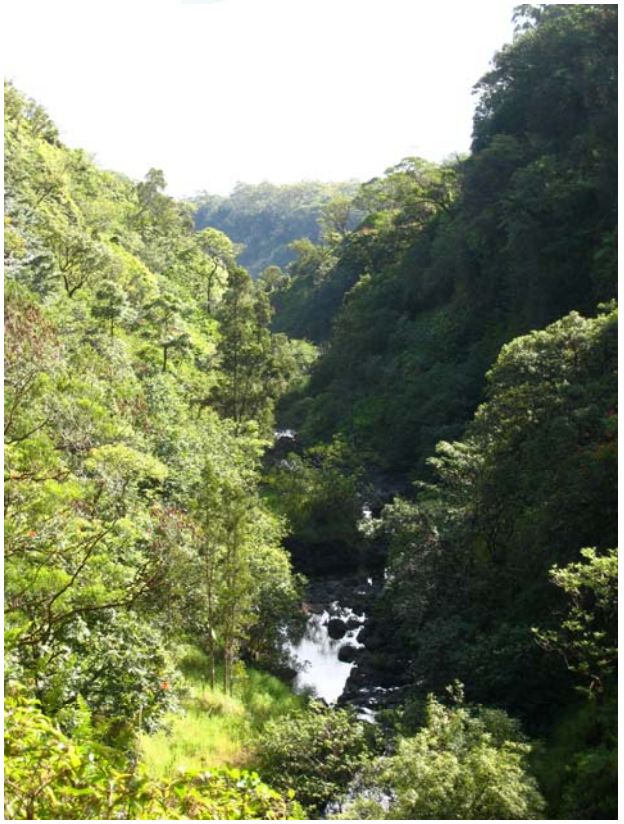
- **Background**
  - Timeline
  - Interim IFS process
  - Adaptive Management
  - Hydrology
- **Issues and Analysis**
  - General Considerations
  - Hydrologic Unit-Specific Considerations

Presentation Overview

- **Background**
  - Timeline
  - Interim IFS process
  - Adaptive Management
  - Hydrology
- **Issues and Analysis**
  - **General Considerations**
  - Hydrologic Unit-Specific Considerations

General Considerations

- **Sustainability**
  - Agriculture
- **Public health**
  - Health risks of stagnant water
  - Nutrition
- **Decreased streamflow**
  - Reduction in ground water storage and recharge
  - Decreased annual rainfall
  - Increased water demand
  - Climate change
  - Landcover change



East Wailuanui Stream, Maui

General Considerations

- **Ongoing water issue**
  - Dates back to the 1881 petition
- **Status quo interim IFS**
  - Initial establishment
  - Differing opinions
  - Lack of data
- **Cultural landscape study**
  - Support return of water and taro farming
- **EMI cultural study**
  - Relationship between EMI and community

General Considerations

- **HC&S water needs**
  - Accuracy of information
  - Other sources of water
- **Agricultural subsidies**
  - Economics of HC&S / EMI operations
- **Upcountry Maui**
  - Residents rely on EMI water
- **Energy**
  - Sales to MECO
  - Renewable energy - hydroelectric and biomass

Wailoa Ditch siphon at Maliko Gulch. It transports water to west and central Maui

General Considerations

- **Water management practices**
  - Release of water downstream
  - Impact to downstream resources
- **Water use by HC&S**
  - NHLC calculation
    - Winter: 134 mgd over 7,560 ac = 17,724 gad
    - Summer: 268 mgd over 7,560 ac = 35,449 gad
  - HC&S calculation
    - Winter: 17,724 gad applied 2 out of 7 days = 5,064 gad
    - Summer: 35,449 gad applied 2 out of 7 days = 10,128 gad

MGD = million gallons per day; ac = acres; gad = gallons per acre per day

General Considerations

- **Alternative water sources (HC&S)**
  - Brackish water from wells
- **Viability of HC&S**
  - Land size and location
  - Revenue from energy sales
  - Other sources of water
  - Product diversity line

HC&S Co., sugar mill, Maui

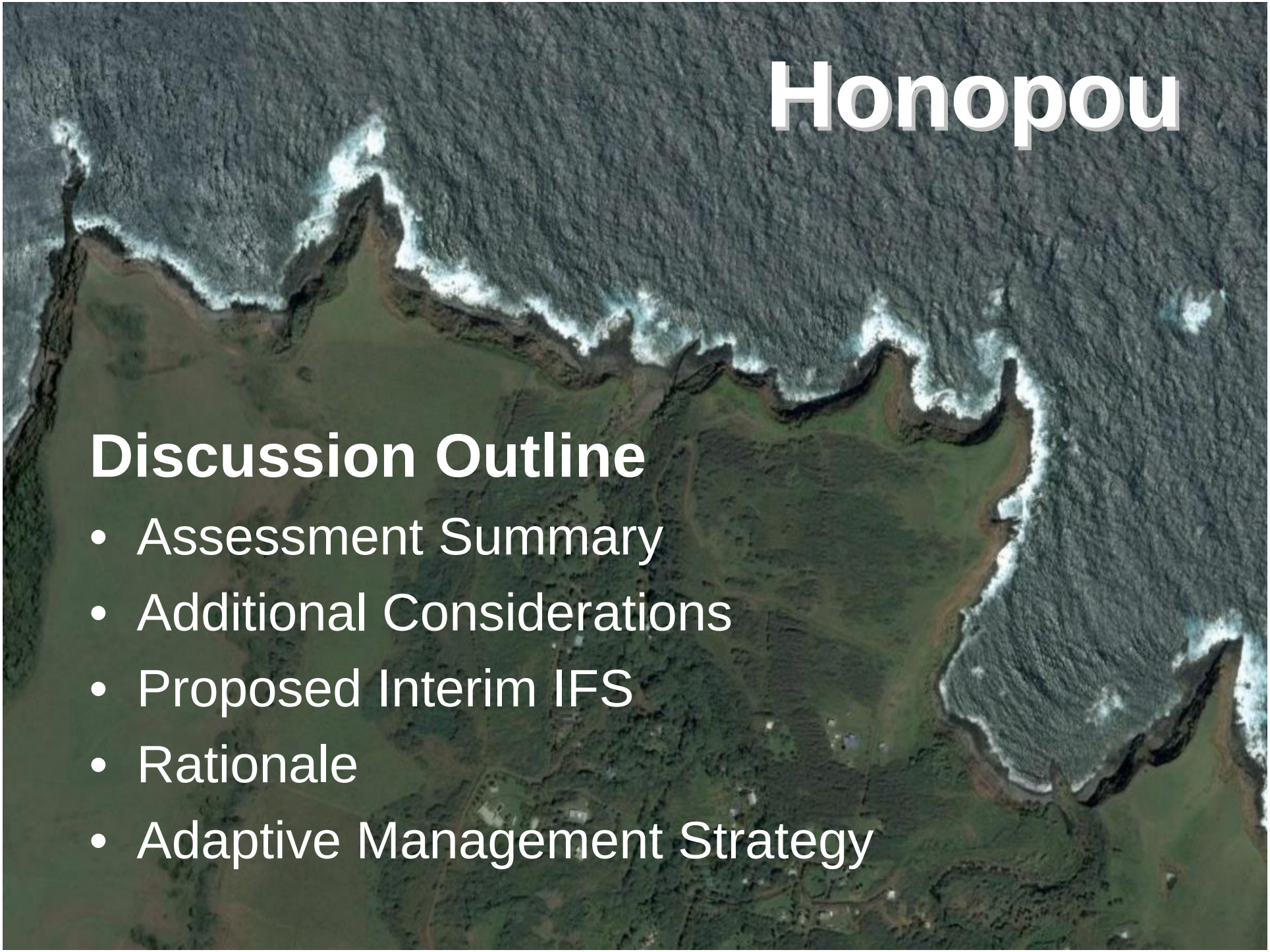
Presentation Overview

- **Background**
  - Timeline
  - Interim IFS process
  - Adaptive Management
  - Hydrology
- **Issues and Analysis**
  - General Considerations
  - **Hydrologic Unit-Specific Considerations**

Discussion Outline

Hydrologic Unit-Specific Considerations

- Assessment Summary
- Additional Considerations
- Rationale
- Diagrams
- Adaptive Management Strategy



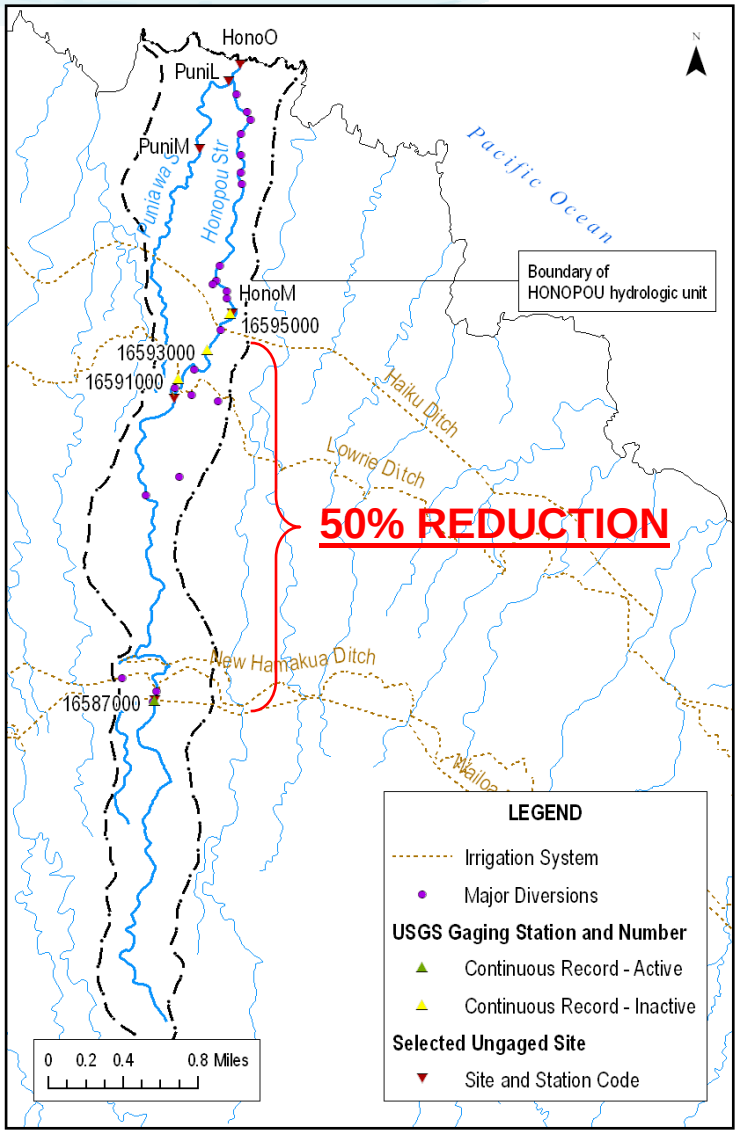
Honopou

Discussion Outline

- Assessment Summary
- Additional Considerations
- Proposed Interim IFS
- Rationale
- Adaptive Management Strategy

Assessment Summary

- **Hydrology**
  - Gaining stream
  - Gain: 2.3 MGD
  - Diversions: 50% reduction
  - Bypass pipes at Haiku Ditch
  - Decreasing long-term trend in streamflow



MGD = million gallons per day

Assessment Summary

- **Fish and Wildlife**
  - Poor diversity
  - Oopu alamoo in upper reaches
  - Lack of streamflow continuity
  - Deep pools and dewatered sections
  - Pipes in diversion structures

Native Hawaiian fish: Oopu alamoo (Lentipes concolor)

- **Recreational**
  - HSA - swimming

Assessment Summary

- **Ecosystem Maintenance**
  - 40% is East Maui Watershed Partnership area
  - 25% is Koolau Forest Reserve
- **Aesthetic**
  - Limited
- **Water Quality**
  - Class 2 - Puniawa, lower reaches of Honopou Stream
  - Class 1 - Upper reaches of Honopou Stream

Honopou Stream upstream of Haiku Ditch

Assessment Summary

- **Irrigation and Domestic**
  - Total of 15 non-EMI diversions
  - 12 registered domestic uses (no access to county water service)
  - All 15 registered for cultivation of other crops and/or livestock
- **Traditional and Customary**
  - 2 appurtenant rights claimants
  - 6 registered for taro cultivation
  - Gathering

Kekahuna's taro loi, Honopou

Assessment Summary

- **Noninstream**
  - EMI diversions - 7 major, 2 minor
  - EMI supplies water to:
    - HC&S
    - Makawao DWS system
    - MLP
  - Effects of decreasing water diverted
    - Irrigation in west and central Maui
    - Long-term trends in ground water levels

EMI diversions at Wailoa Ditch and New Hamakua Ditch, Honopou Stream

Additional Considerations

- **BLNR Contested Case**
  - Appurtenant rights
  - Accuracy of flow measurements
  - Taro water needs
- **Public testimony**
  - Stream is diverted 4 times by EMI
  - Water temperature
  - Taro root rot
- **Other sources of water**
  - No county water system

Kekahuna / Wallett auwai, Honopou

Rationale

- **Why restore flow?**
  - Increase flow continuity for stream biota
  - Improve recreational and aesthetic opportunities
  - Ecosystem maintenance (Koolau Forest Reserve)
  - Downstream surface water users
  - Potential water use

Waterfall at Honopou Stream

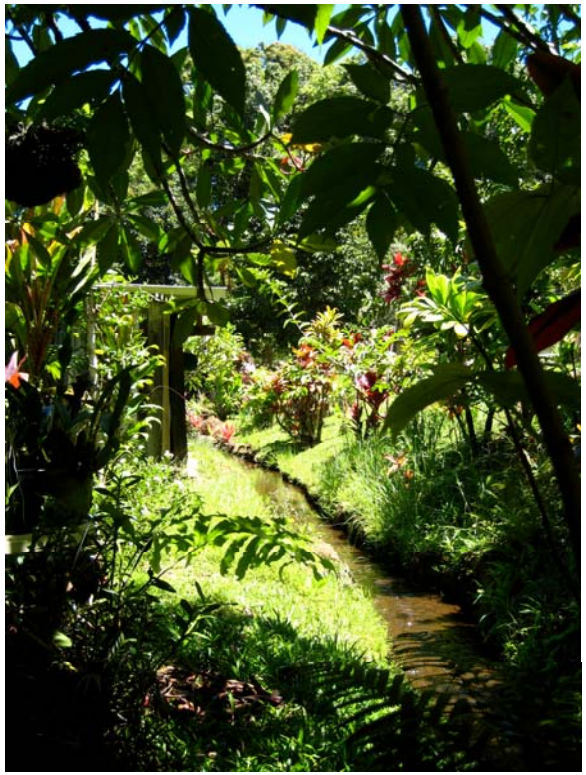
Rationale

- **Why not full restoration?**
  - Upcountry Maui - domestic use, agriculture
  - Central Maui - agriculture
  - Power to MECO
  - Diversified agriculture
  - Sustainability

Sugarcane cultivation

Rationale

- **Interim IFS A**
  - Estimate: Based on average annual ground water gain
  - Purpose: Water for downstream users
- **Interim IFS B**
  - Estimate: Based on Q_{90} natural (undiverted) flow
  - Purpose: Biological integrity



Kekahuna / Wallett auwai, Honopou

HONOPOU

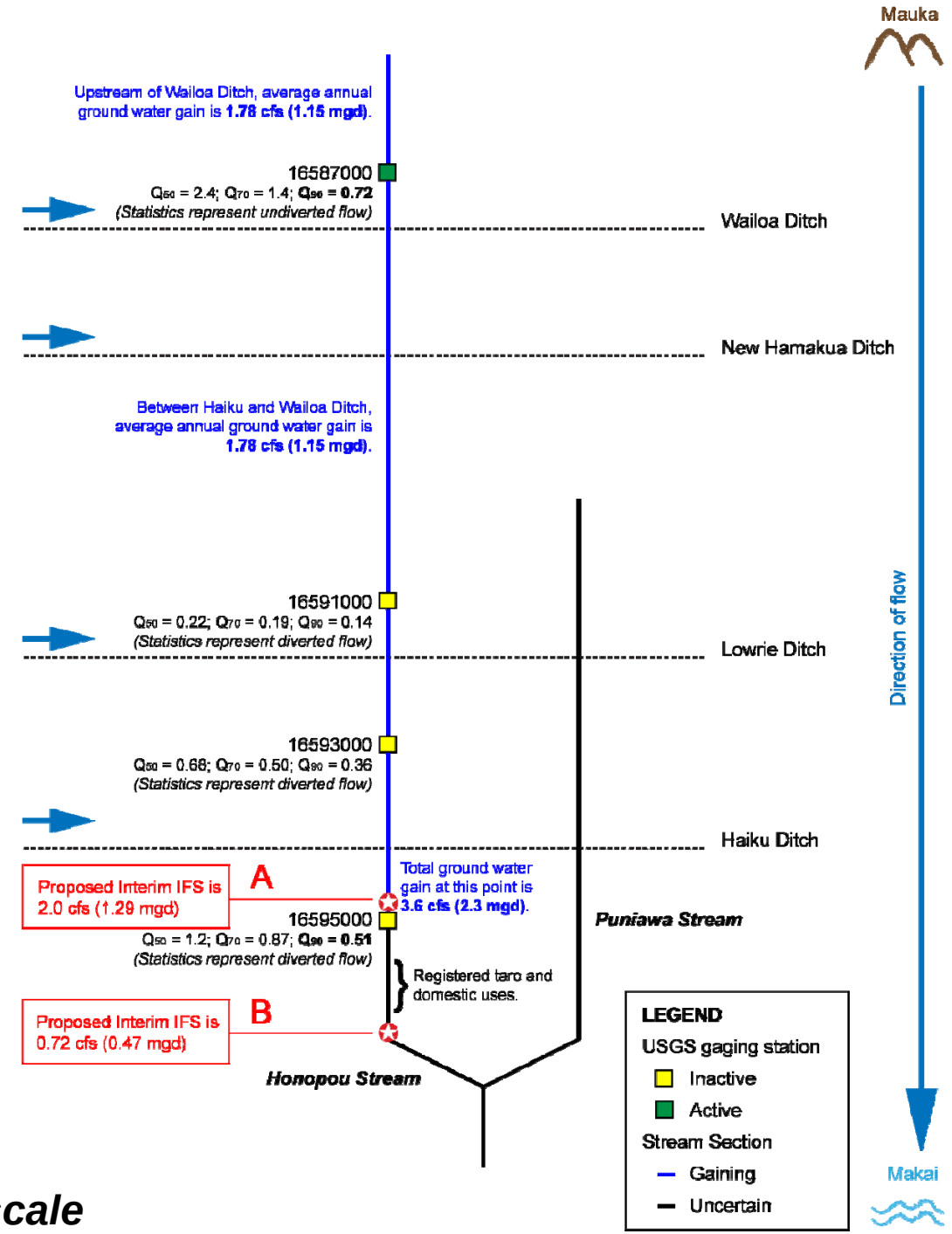


Diagram not to scale

Proposed Interim IFS

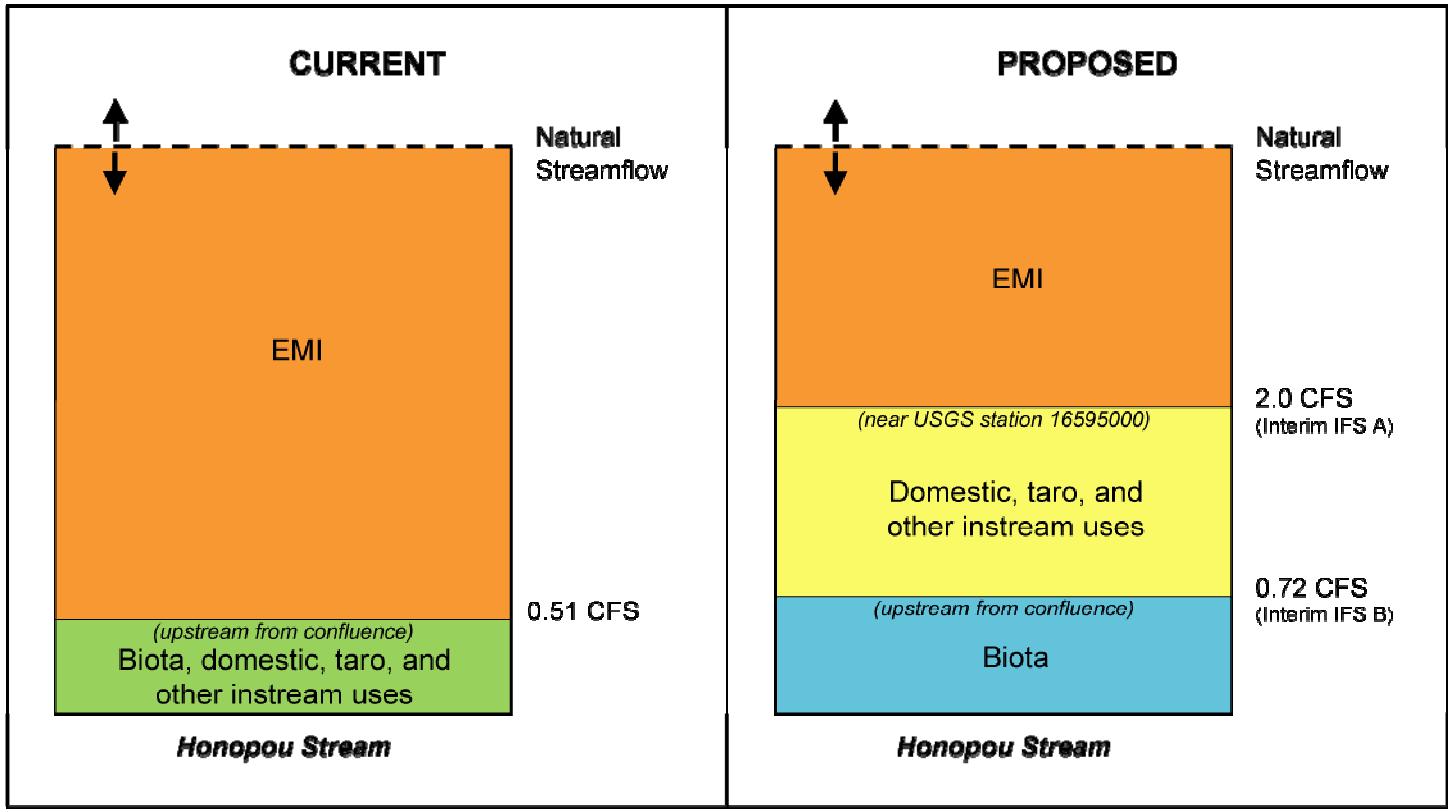


Diagram not to scale

Adaptive Management

- **Hydrologic Unit-Specific**
  - Alter bypass pipes at Haiku Ditch to allow upstream migration of native species

Bypass pipes at Haiku Ditch, Honopou Stream

Adaptive Management

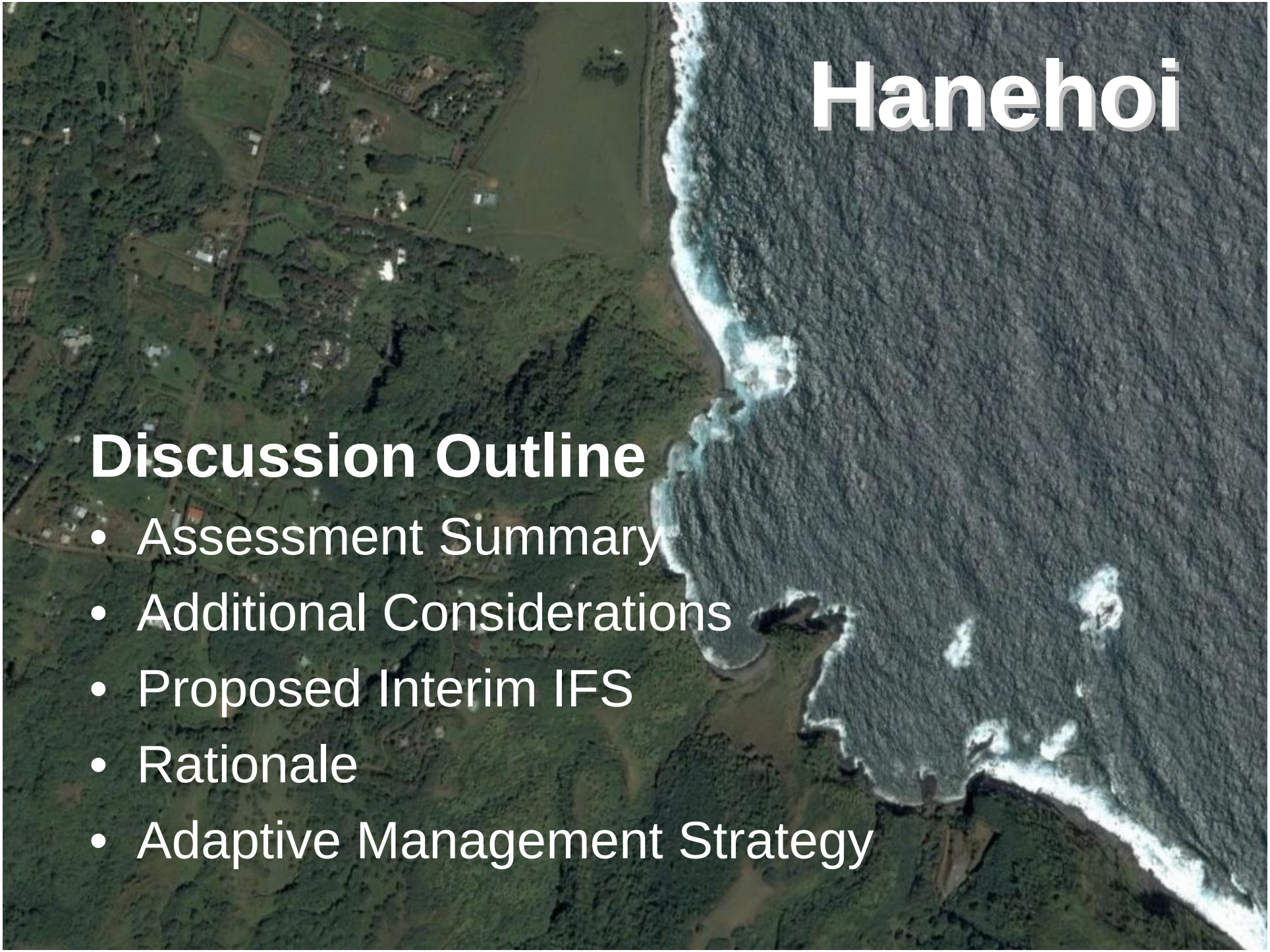
- **General Strategies**
  - Implementation
    - Comply with State Water Code for unregistered diversions
    - Collaborate with agency staff and registered diversion owners to determine appropriate actions
    - Coordinate with EMI and DAR to assess existing conditions and status of EMI diversions

Adaptive Management

- **General Strategies**
  - Monitoring
    - Monitor streamflow by taking periodic measurements
    - Conduct periodic biological surveys
    - Affected parties monitor and document the negative impacts of diversions or adopted interim IFS
    - Conduct investigations with granted access to stream channels and private property

Adaptive Management

- **General Strategies**
  - Evaluation
    - Report to Commission within one year from date of adoption
    - Assess implementation of adaptive management strategies
    - Prepare long-term management framework

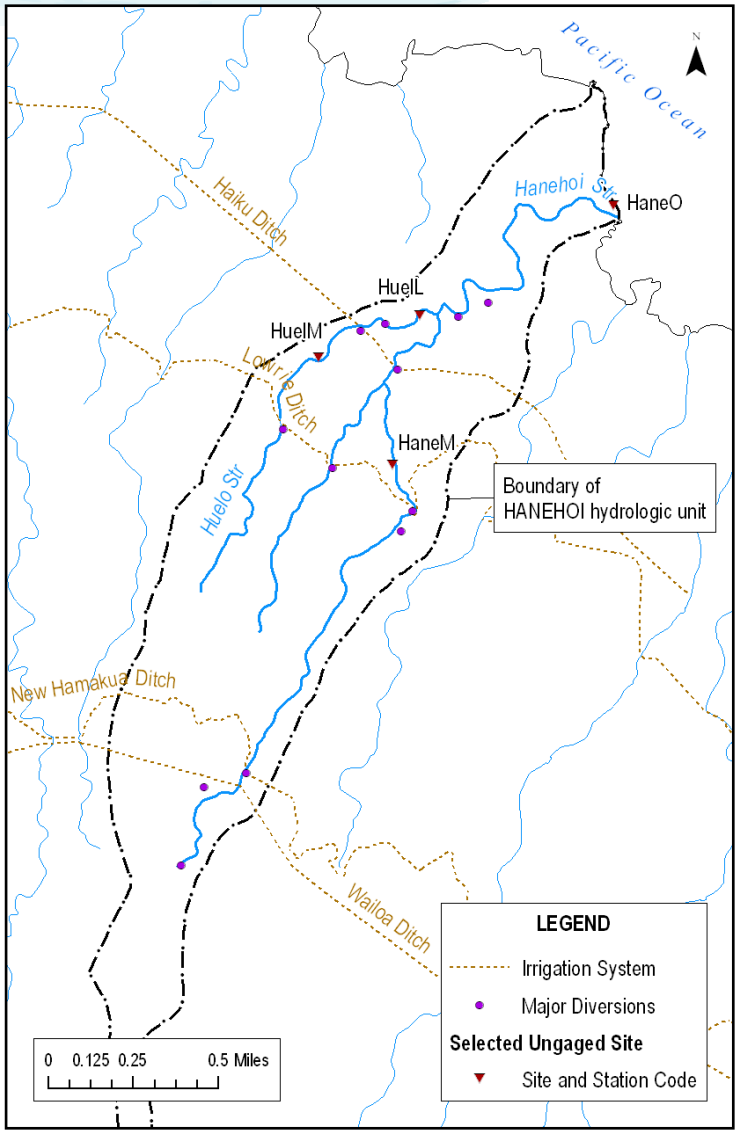


Discussion Outline

- Assessment Summary
- Additional Considerations
- Proposed Interim IFS
- Rationale
- Adaptive Management Strategy

Assessment Summary

- **Hydrology**
  - Little flow
  - No data on whether stream is gaining or losing
  - Data based on regression estimates
  - Terminal waterfall



Assessment Summary

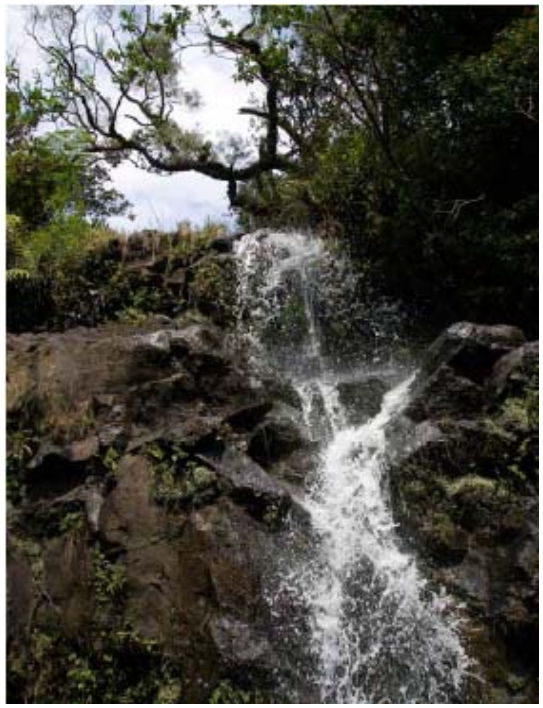
- **Fish and Wildlife**
  - Degraded
  - Only oopu alamoo in upper reaches
  - Lack of streamflow continuity
  - Deep pools and dewatered sections
  - Pipes in diversion structures
  - Terminal waterfall restricts migration

Native damselfly, Megalagrion pacificum

- **Recreational:**
  - HSA - “Limited”
  - Established agricultural educational centers

Assessment Summary

- **Ecosystem Maintenance**
  - 70% in East Maui Watershed Partnership area
  - 30% is Koolau Forest Reserve
- **Aesthetic**
  - Limited
- **Water Quality**
  - Class 2 - recreational and agricultural uses, aquatic life



Waterfall at Hanehoi Stream

Assessment Summary

- **Irrigation and Domestic**
  - Total of 5 non-EMI diversions
  - 1 registered domestic use (30 families in Huelo community)
  - 4 registered for cultivation of taro, other crops, and/or livestock

- **Traditional and Customary**
  - 2 registered for taro cultivation
  - Archaeological remains of taro loi in lower reaches
  - Gathering

Assessment Summary

- **Noninstream**
  - EMI diversions - 7 major, 7 minor
  - EMI supplies water to:
    - HC&S
    - Makawao DWS system
    - MLP
  - Effects of decreasing water diverted
    - Irrigation in west and central Maui
    - Long-term trends in ground water levels

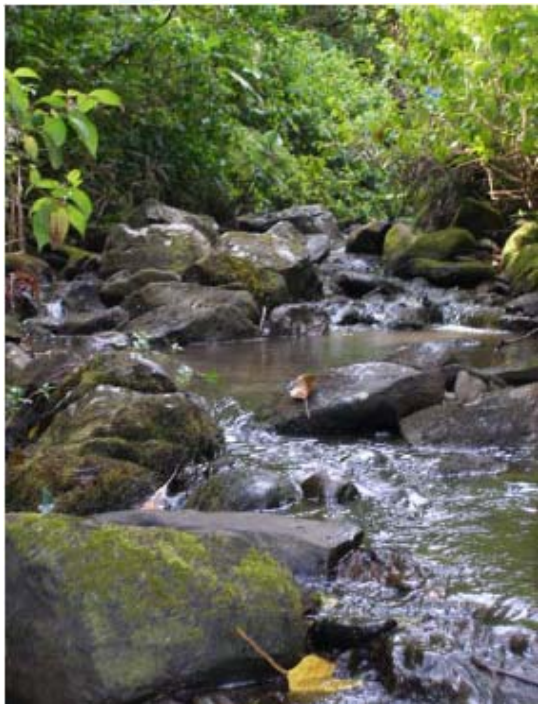
EMI diversion at Lowrie Ditch, Hanehoi Stream

Additional Considerations

- **Maui Tomorrow**
  - Domestic water use in Huelo community
- **HC&S**
  - Water needs of Ernest Schupp
  - Auwai not in use
  - Questions the need to amend interim IFS

Rationale

- **Why restore flow?**
  - Increase flow continuity for stream biota
  - Improve recreational and aesthetic opportunities
  - Ecosystem maintenance (Koolau Forest Reserve)
  - Downstream surface water users
  - Potential water use



Hanehoi Stream

Rationale

- **Why not full restoration?**
  - Upcountry Maui - domestic use, agriculture
  - Central Maui - agriculture
  - Power to MECO
  - Sustainability - diversified agriculture

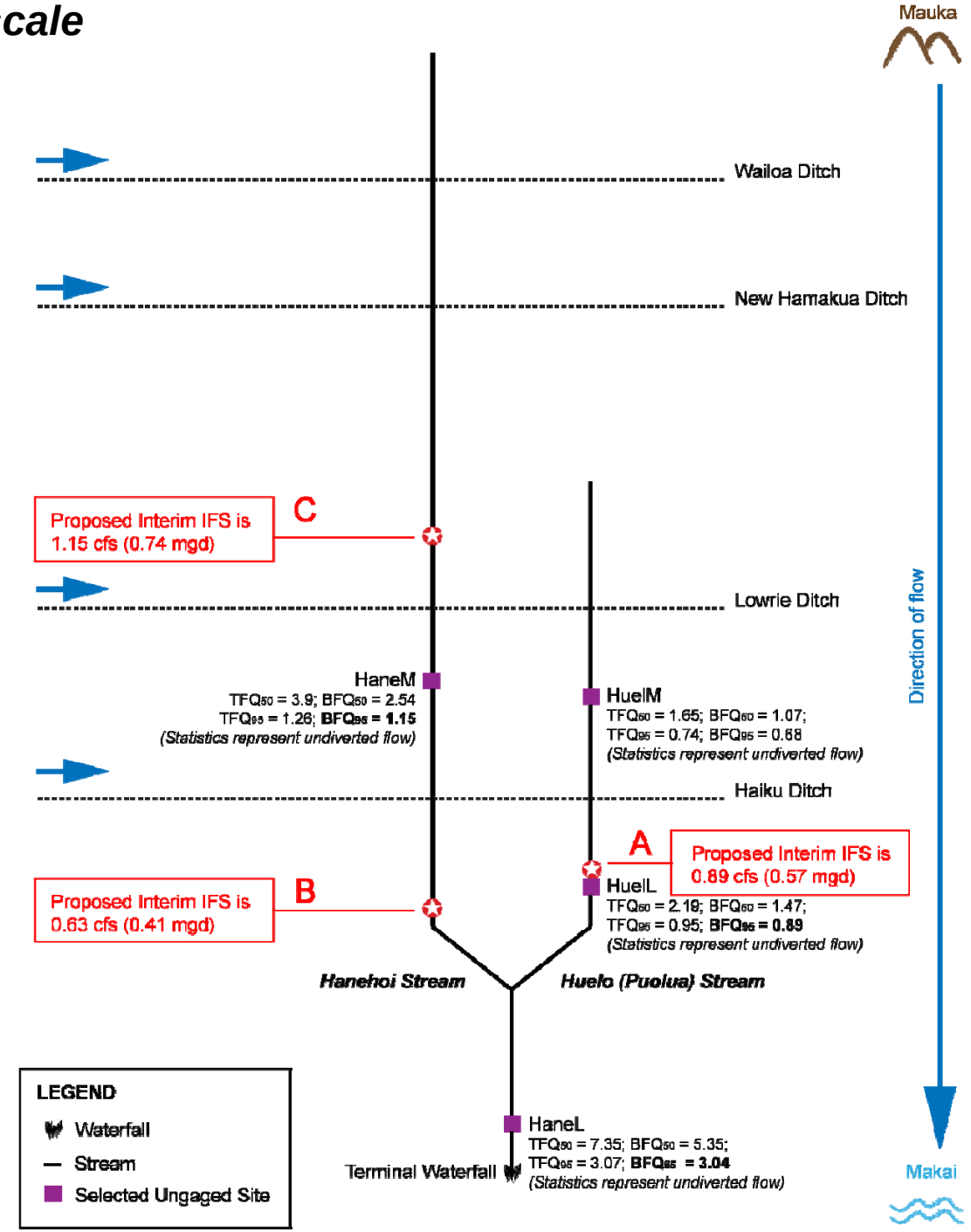
Pineapple cultivation

Rationale

- **Interim IFS A**
  - Estimate: Based on BFQ_{95} natural (undiverted) flow
  - Purpose: Water for downstream users and stream biota
- **Interim IFS B**
  - Estimate: Based on BFQ_{95} natural (undiverted) flow
  - Purpose: Water for downstream users and stream biota
- **Interim IFS C**
  - Estimate: Based on BFQ_{95} natural (undiverted) flow
  - Purpose: Water for Huelo community

HANEHOI

Diagram not to scale



Proposed Interim IFS

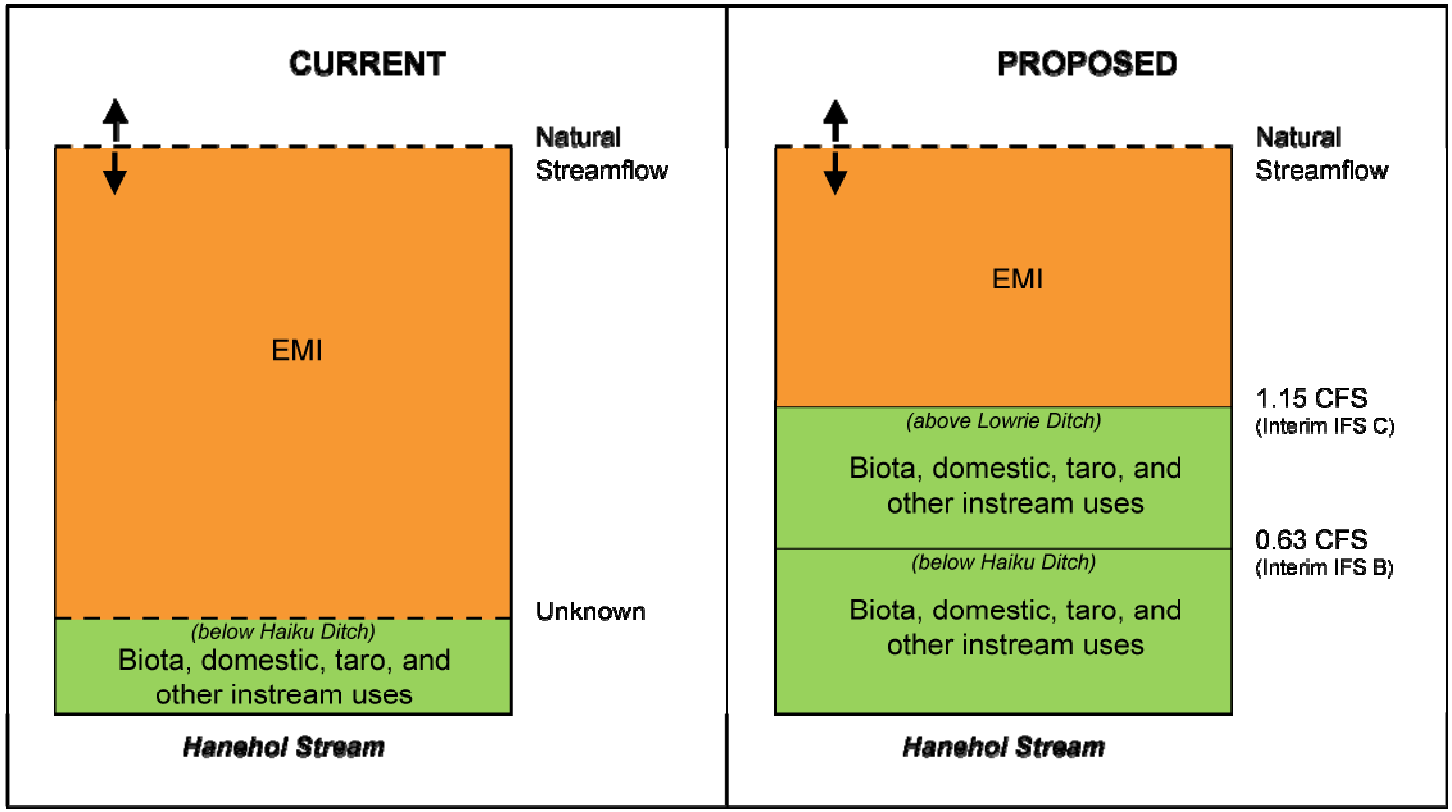


Diagram not to scale

Proposed Interim IFS

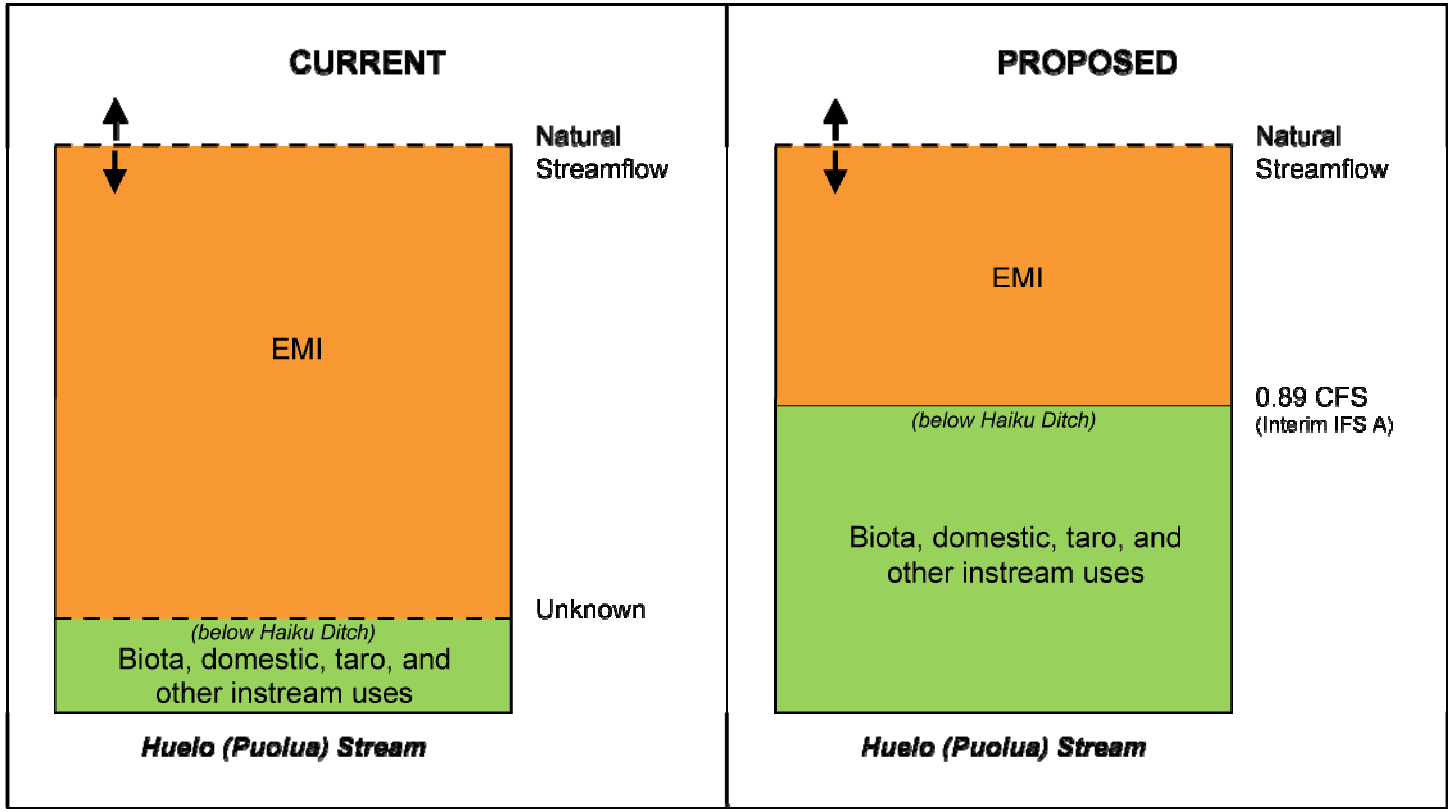


Diagram not to scale

Adaptive Management

- **Hydrologic Unit-Specific**
  - Alter diversions at Haiku Ditch and Lowrie Ditch to allow upstream migration of native species
  - Periodic monitoring of flow below lowest diversion

EMI diversion at Haiku Ditch, Hanehoi Stream

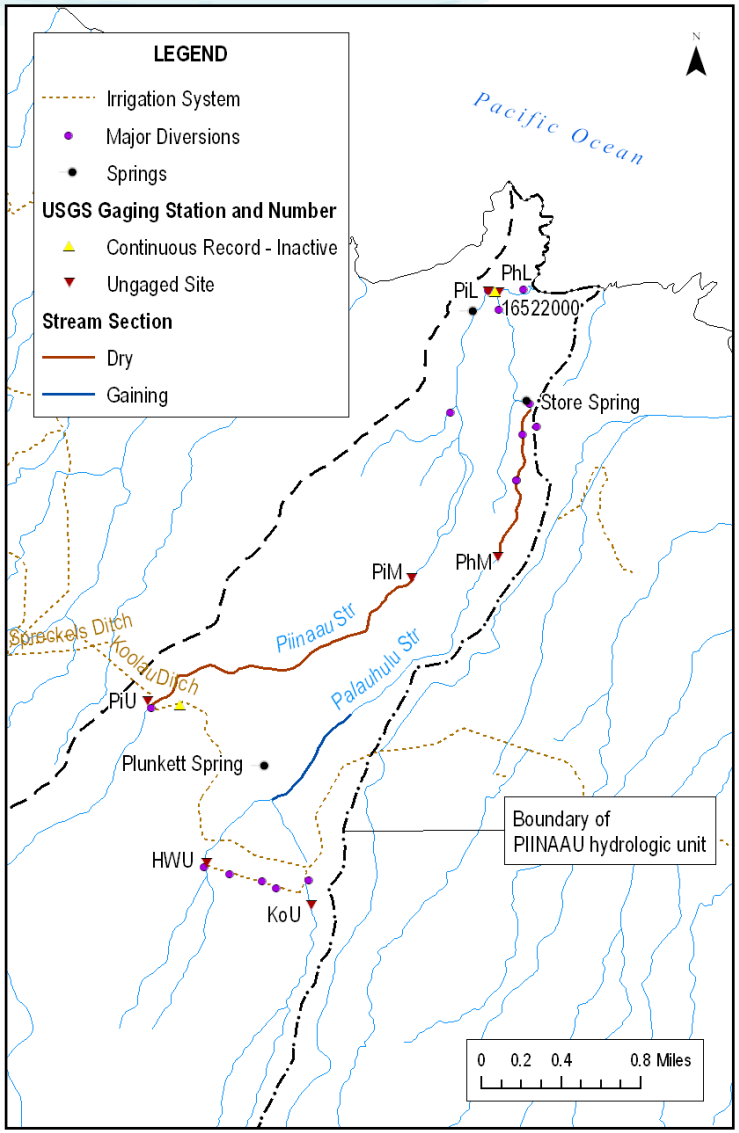
- **General Strategies**
  - Implementation
  - Monitoring
  - Evaluation

Discussion Outline

- Assessment Summary
- Additional Considerations
- Proposed Interim IFS
- Rationale
- Adaptive Management Strategy

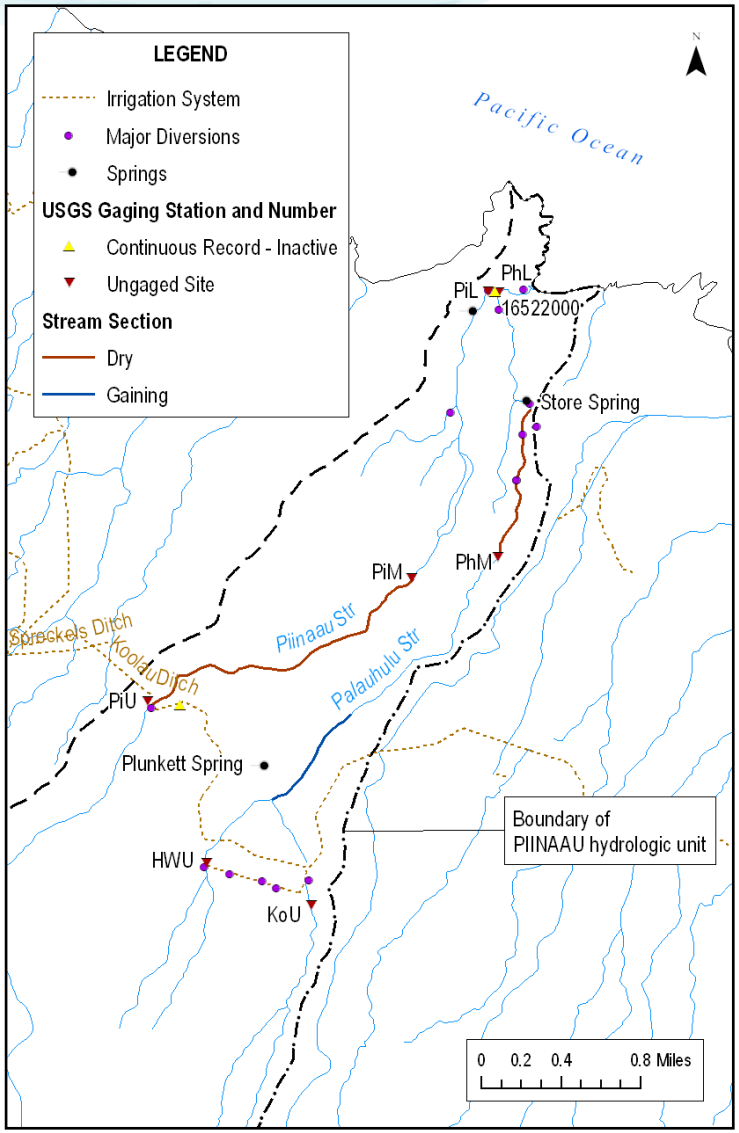
Assessment Summary

- **Hydrology: Piinaau**
  - Dry below Koolau Ditch
  - Landslide in 2001
  - Keanae has complex geology
  - Data based on regression estimates (USGS)



Assessment Summary

- **Hydrology: Palauhulu**
  - Plunkett Spring: 2.7 CFS
  - Dry upstream of Store Spring
  - Data based on regression estimates (USGS)



CFS = cubic feet per second

Assessment Summary

- **Fish and Wildlife**
  - Rich diversity
  - Larval recruitment
  - Estuary - Waialohe Pond
  - Lack of streamflow continuity
  - Deep pools and dewatered sections

Native Hawaiian fish: Oopu nakea (Awaous guamensis)

- **Recreational**
  - HSA - “Outstanding”
  - Swimming, fishing, hiking, nature study

Assessment Summary

- **Ecosystem Maintenance**
  - 85% is part of Haleakala National Park, Koolau Forest Reserve, and Waikamoi Preserve
- **Aesthetic**
  - Waiokuna and Keaku Falls
  - Keanae Arboretum
- **Water Quality**
  - Class 1 – “protective” conservation sub-zone

Headwaters of Piinaau Stream

Assessment Summary

- **Irrigation and Domestic**
  - Total of 8 non-EMI diversions
  - 4 registered domestic uses
  - 8 registered for cultivation of taro, other crops and/or livestock
- **Traditional and Customary**
  - 5 registered for taro cultivation
  - Keanae Arboretum - 14 loi, fed by Piinaau Stream
  - Keanae complex - 107 loi, fed by Palauhulu Stream
  - Waialohe Fishpond
  - Gathering

Assessment Summary

- **Noninstream**
  - EMI diversions - 6 major, 6 minor
  - EMI supplies water to:
    - HC&S
    - Makawao DWS system
    - MLP
  - Effects of decreasing water diverted
    - Irrigation in west and central Maui
    - Long-term trends in ground water levels

EMI diversion at Koolau Ditch, Piinaau Stream

Additional Considerations

- **Public Testimony**
  - Inadequate water for taro cultivation in Keanae
- **HC&S**
  - Extensive infiltration
  - Questions the need to amend interim IFS

Keanae flume, Palauhulu Stream

Rationale

- **Interim IFS A: Piinaau Stream**
  - Complex geology and hydrology of Keanae Valley
  - Landslide in 2001 complicates flow regime
  - Lack of reliable streamflow data
  - Unreliable regression estimates
  - Current condition of the stream (downstream of landslide) is relatively good
  - Only 2 registered diversions

PIINAAU

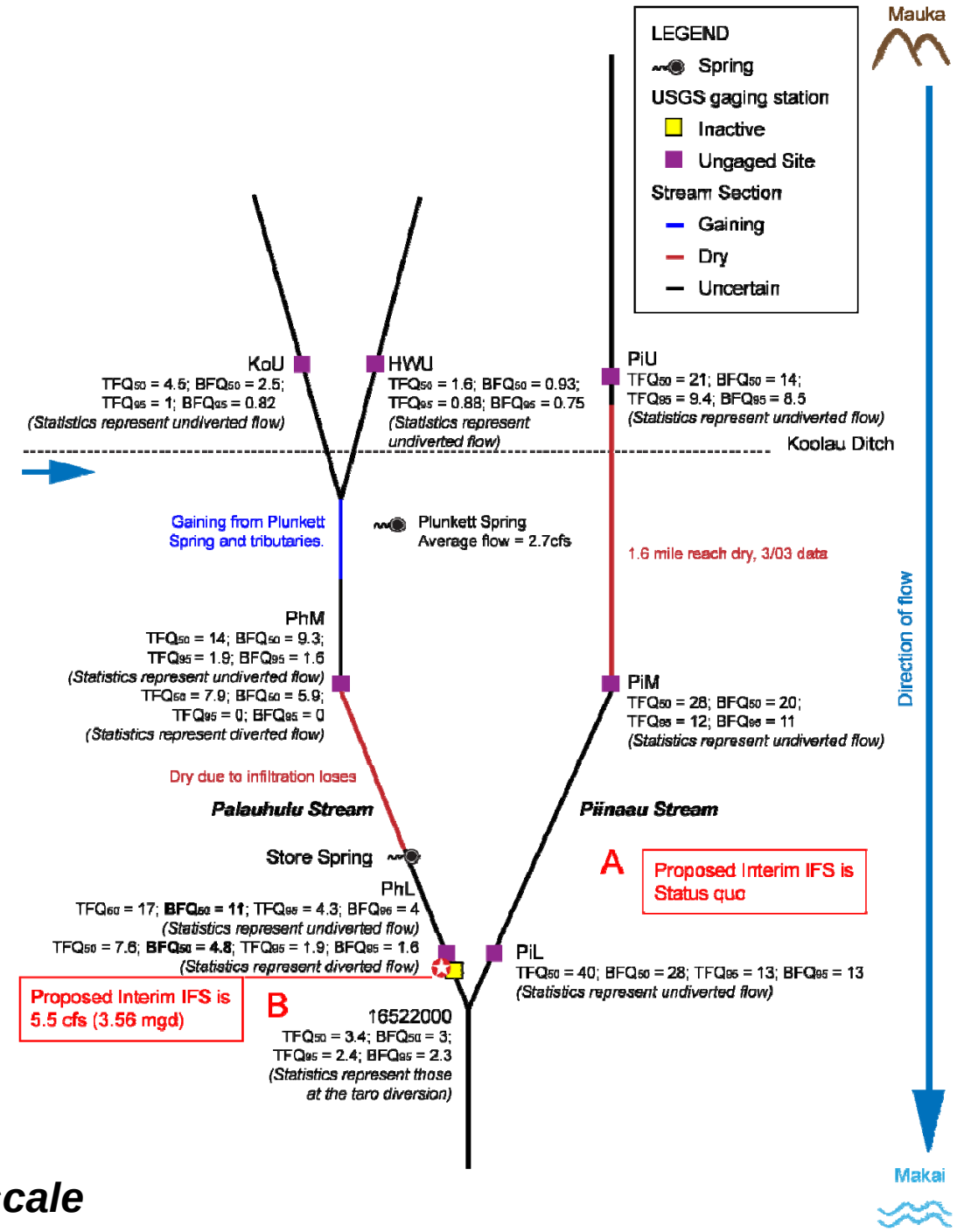


Diagram not to scale

Rationale

- **Interim IFS B: Palauhulu Stream**
  - **Why restore flow?**
    - Increase flow continuity for stream biota
    - Downstream users
    - Potential water use

Waterfall at Kano Stream, tributary of Palauhulu Stream

Rationale

- **Interim IFS B: Palauhulu Stream**
  - **Why not full restoration?**
    - Upcountry Maui - domestic use, agriculture
    - Central Maui - agriculture
    - Power to MECO
    - Diversified agriculture
    - Sustainability

PIINAAU

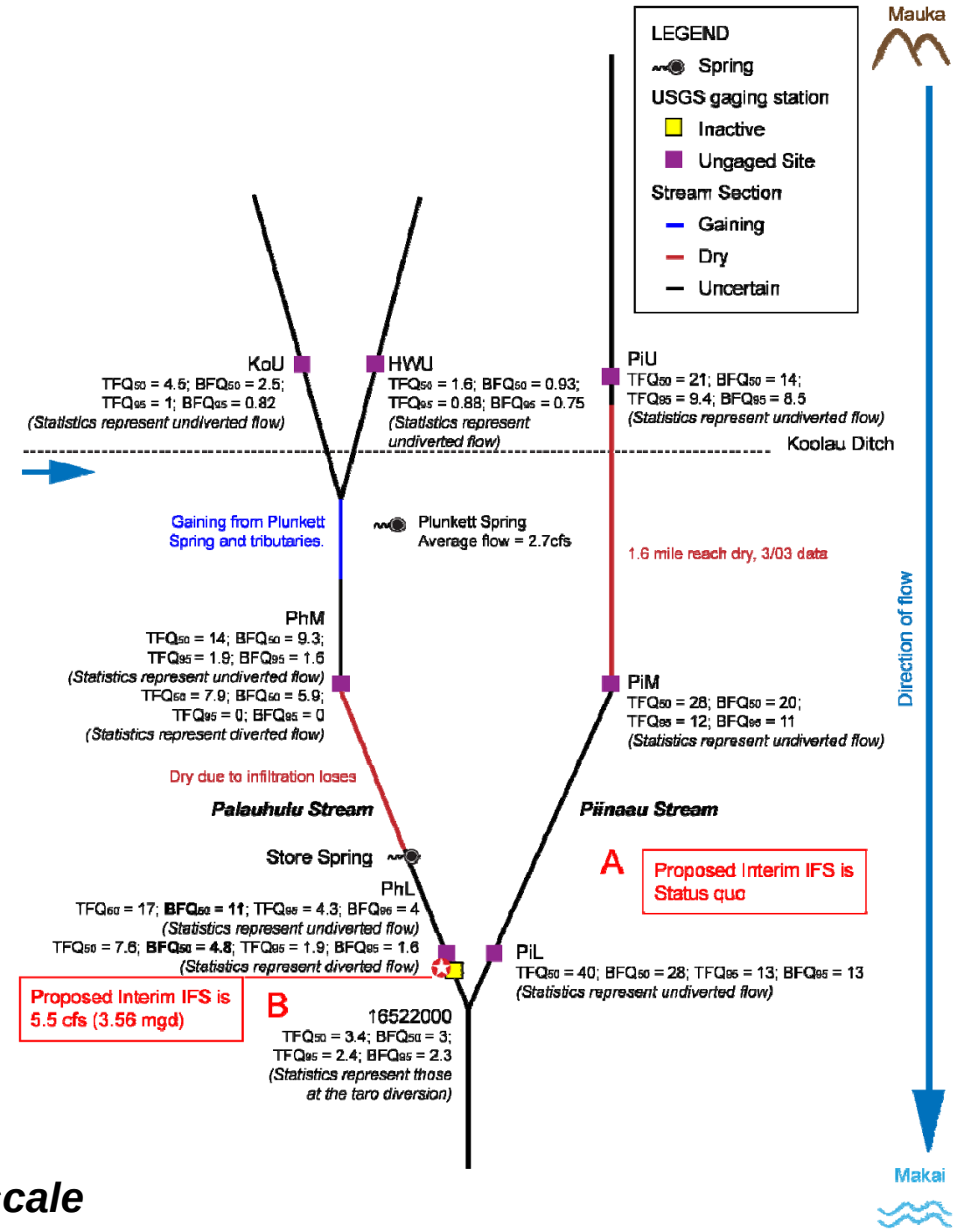


Diagram not to scale

Proposed Interim IFS B

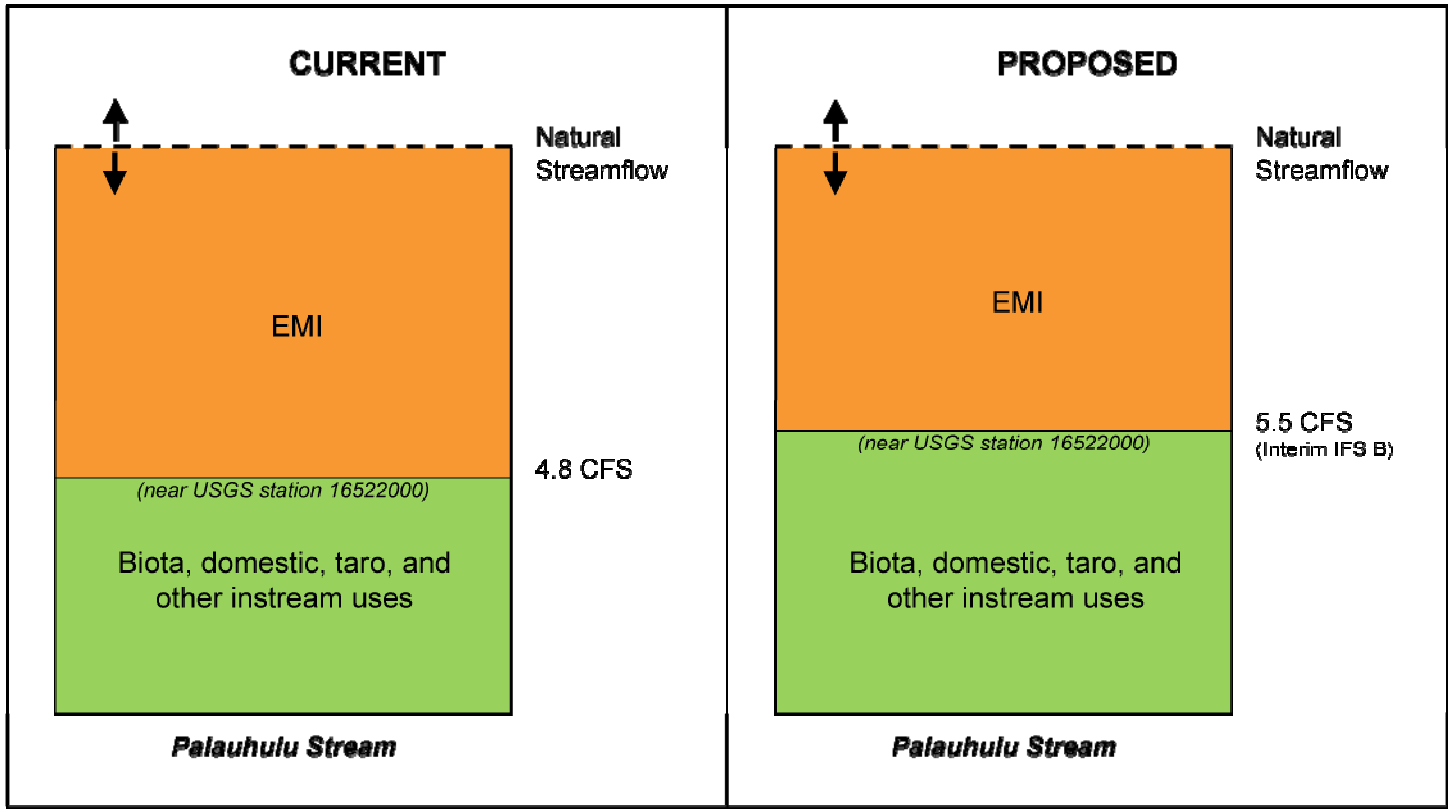


Diagram not to scale

Rationale

- **Interim IFS B**
  - Estimate: Based on median natural base flow (BFQ_{50})
  - Purpose: Water for downstream users and stream biota
- **Why no interim IFS near stream mouth?**
  - Under current conditions, water flowing into Waialohe Pond is adequate
  - Commission may set interim IFS in future if complications arise

Mouth of Piinaau Stream

DIAGRAM

Adaptive Management

- **Hydrologic Unit-Specific**
  - None at this time

- **General Strategies**
  - Implementation
  - Monitoring
  - Evaluation

Waiokamilo

Discussion Outline

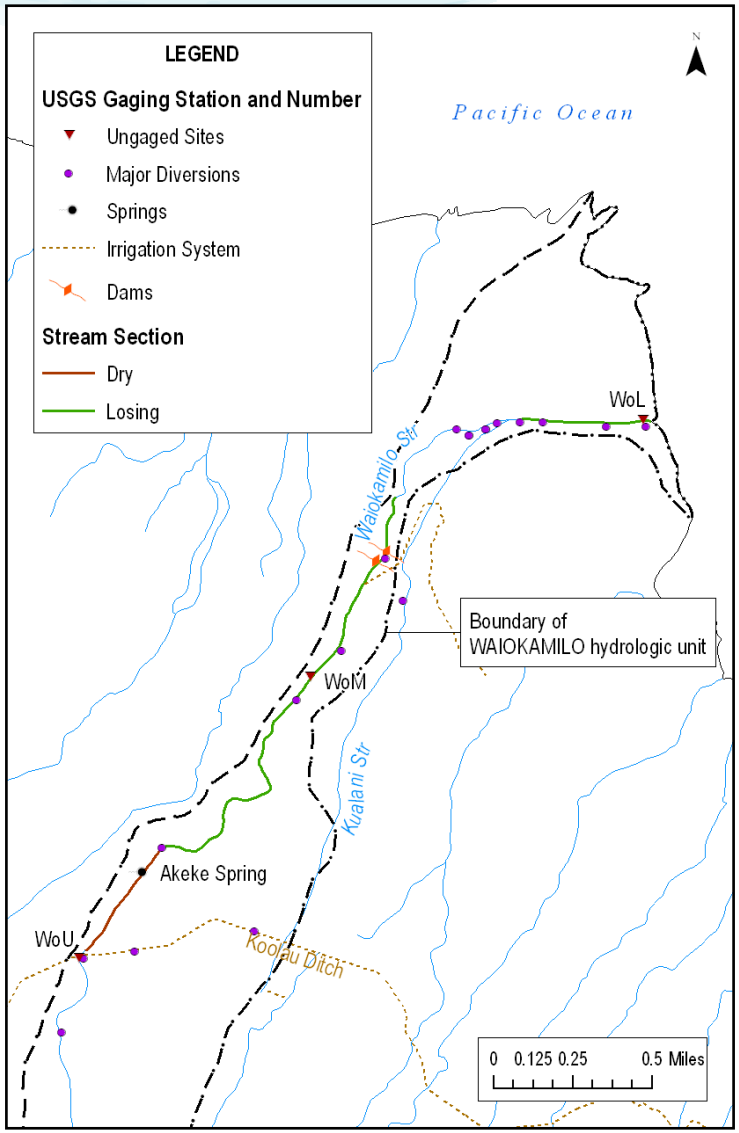
- Assessment Summary
- Additional Considerations
- Proposed Interim IFS
- Rationale
- Adaptive Management Strategy

Assessment Summary

- **Hydrology: Waiokamilo**
  - Losing stream
  - Dry downstream of ditch
  - Akeke Spring: 5.9 CFS
  - Losing reach near dams
  - Waiokilo Falls - terminal fall

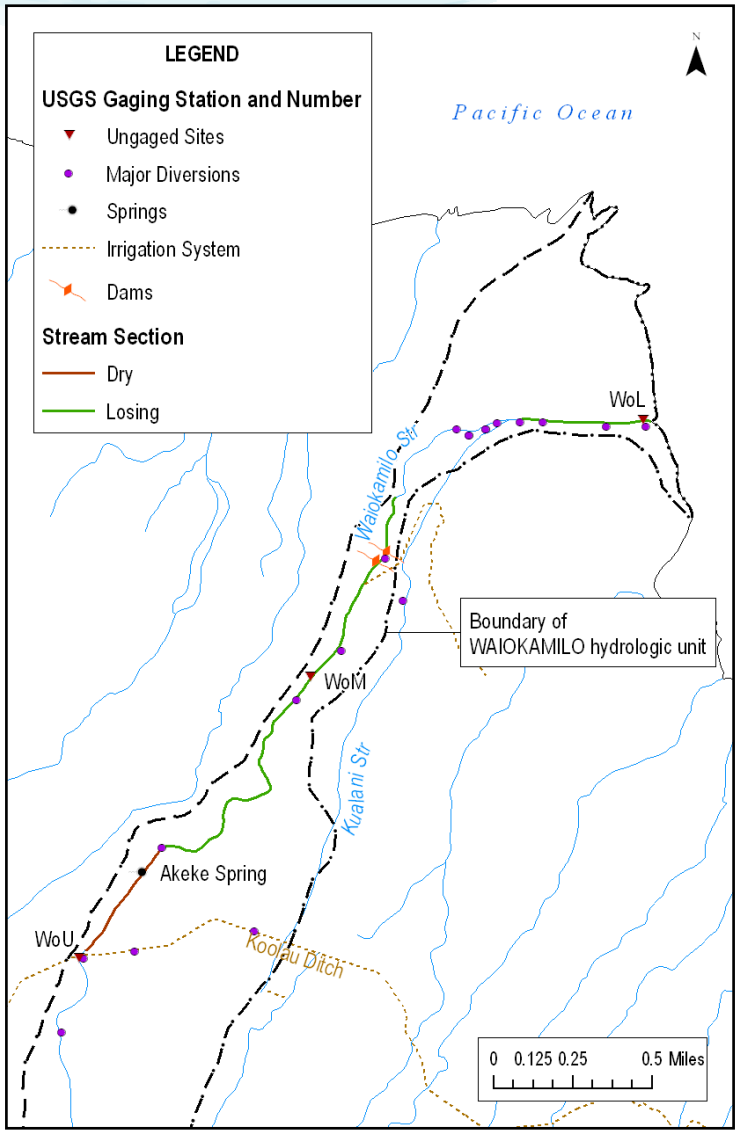
Akeke Spring

CFS = cubic feet per second



Assessment Summary

- **Hydrology: Kualani**
  - Limited data
  - May contribute 1.28 CFS
  - Geographical location uncertain



CFS = cubic feet per second

Assessment Summary

Losing section upstream of Dam 3

Section downstream of Dam 3

Assessment Summary

- **Fish and Wildlife**
  - Moderate
  - Uninhabited sites
  - Terminal waterfall restricts migration
  - Lack of streamflow continuity
  - Deep pools and dewatered sections

Native Hawaiian shrimp: Opae kalaole (Atyoida bisulcata)

- **Recreational**
  - HSA – “Outstanding”
  - Swimming, fishing, hunting, scenic views

Assessment Summary

- **Ecosystem Maintenance**
  - 75% is Koolau Forest Reserve
- **Aesthetic**
  - Waiokilo Falls
  - Wailua Valley State Wayside Lookout
- **Water Quality**
  - Class 1b – “protective” conservation sub-zone

Waiokamilo hydrologic unit

Assessment Summary

- **Irrigation and Domestic**
  - Total of 15 non-EMI diversions
  - 11 registered domestic uses
  - 11 registered for taro, other crops and livestock
- **Traditional and Customary**
  - 11 registered for taro cultivation
  - Supports two of the larger loi complex in Wailua Valley
  - Puu Polu Fishpond, gathering

Assessment Summary

- **Noninstream**
  - EMI diversions - 4 major, 24 minor
  - EMI supplies water to:
    - HC&S
    - Makawao DWS system
    - MLP
  - Effects of decreasing water diverted
    - Irrigation in west and central Maui
    - Long-term trends in ground water levels

EMI minor diversion that is dropping seepage water into a catchment basin, Waiokamilo Stream

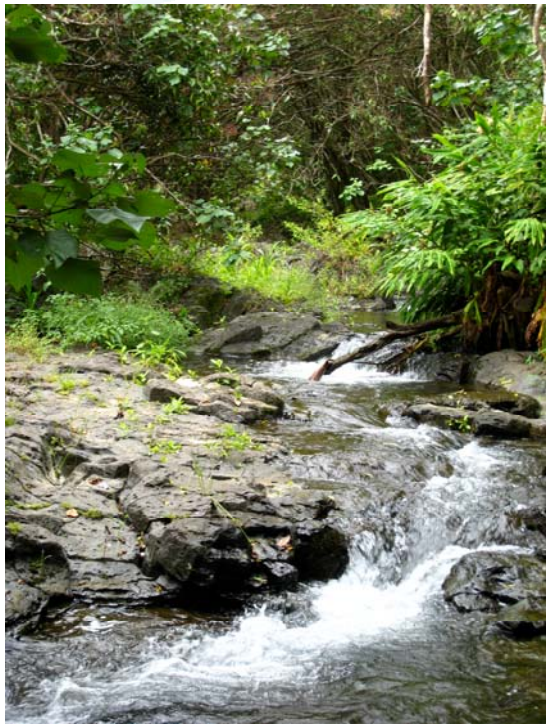
Additional Considerations

- **NHLC**
  - Interim order - monitor
- **Public Testimony / Comments**
  - Public health issues - mosquitoes
  - Recreational - swimming
  - Traditional gathering - opae washed down
  - Water temperature - taro root rot
- **EMI / HC&S**
  - Losing sections of the Waiokamilo Stream
  - Heavy reliance on regression equations
  - Not diverting from Kualani Stream

Taro stunted growth and root rot

Rationale

- **Interim IFS A: Waiokamilo**
  - **Why restore flow?**
    - Increase flow continuity for stream biota
    - Losing reaches
    - Downstream users
    - Potential water use



Upstream from Dam 3 on Waiokamilo Stream

Rationale

- **Interim IFS A: Waiokamilo**
  - **Why not full restoration?**
    - Upcountry Maui - domestic use, agriculture
    - Central Maui - agriculture
    - Power to MECO
    - Diversified agriculture
    - Sustainability

Ranch in Maui

WAIOKAMILO

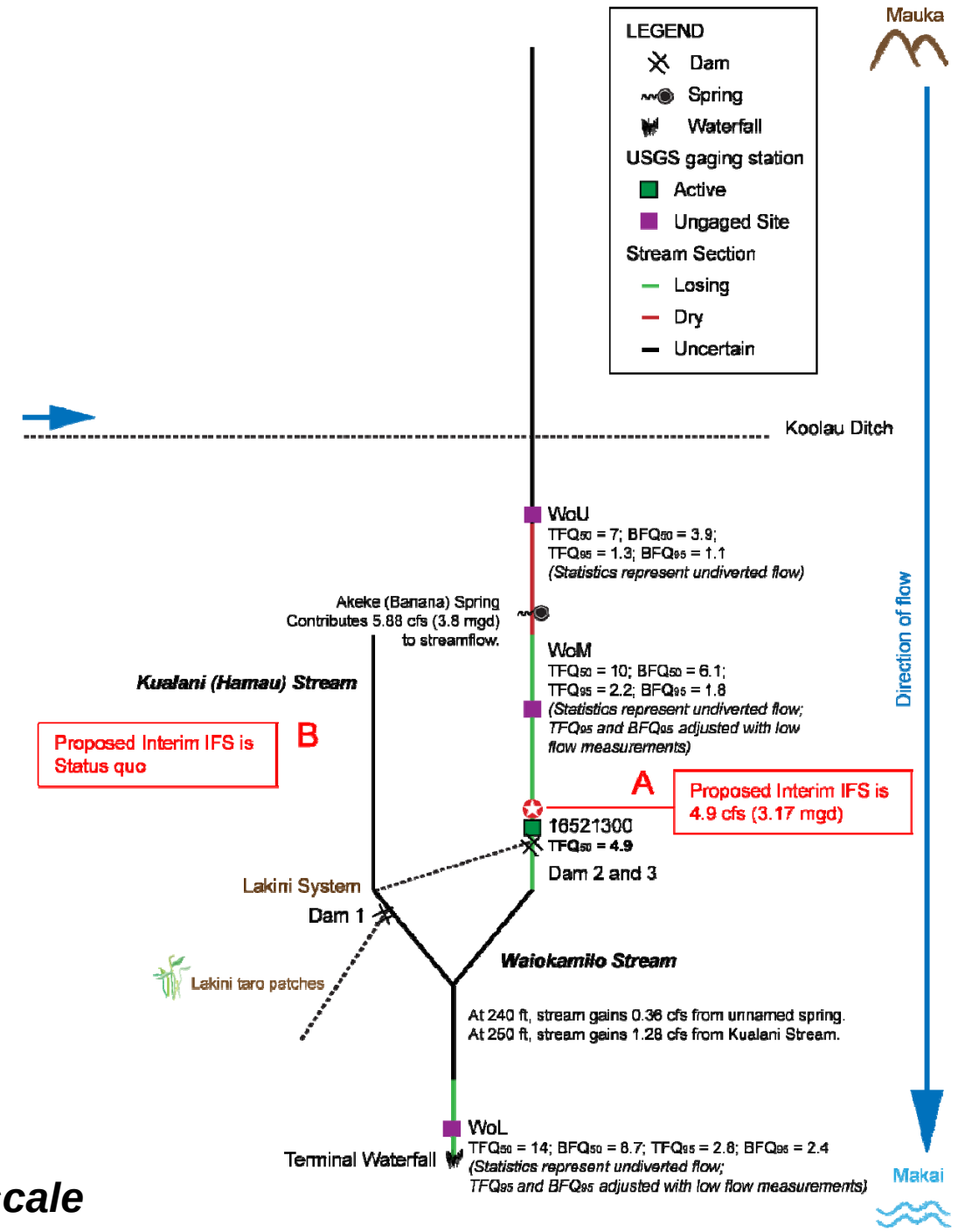


Diagram not to scale

Proposed Interim IFS A

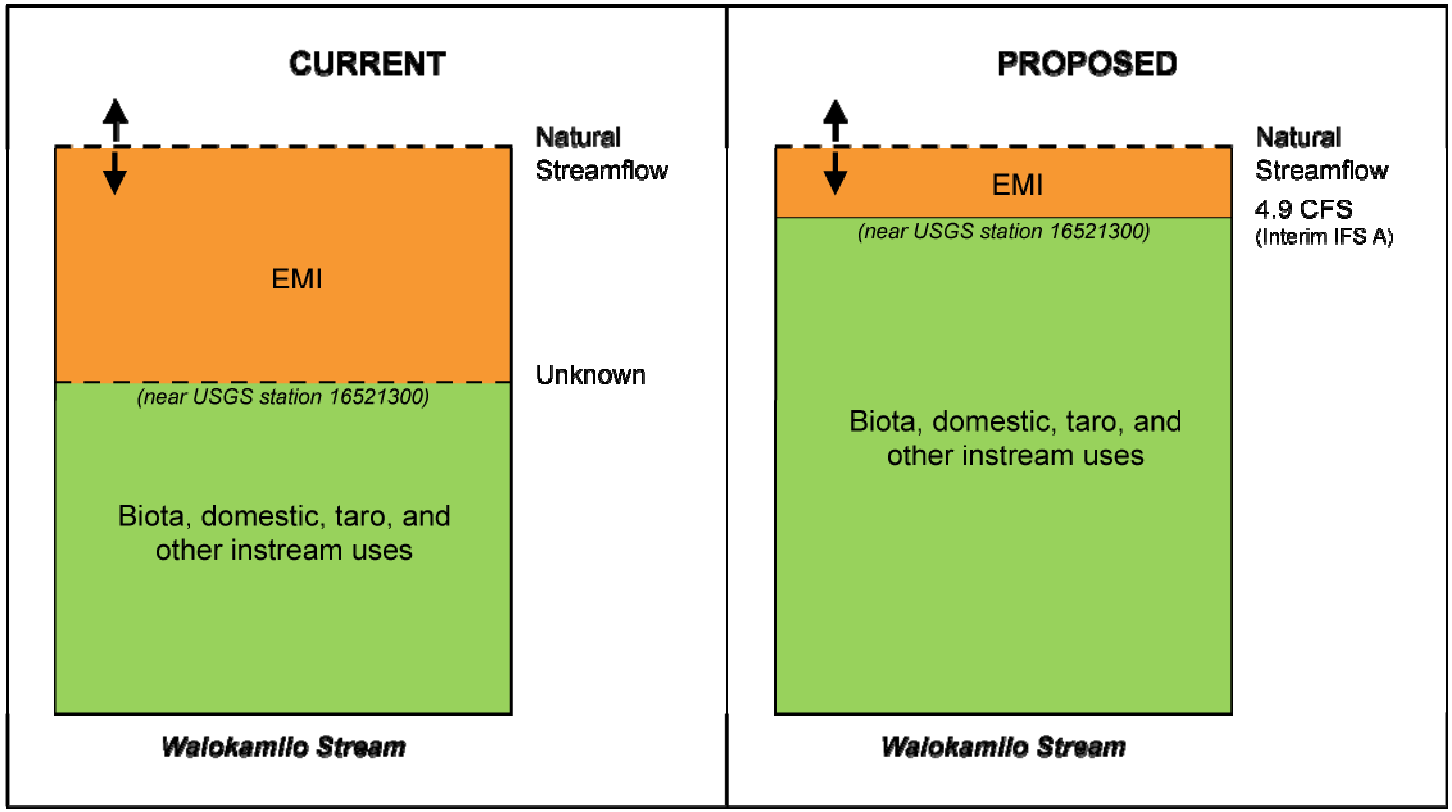


Diagram not to scale

Rationale

- **Interim IFS B: Kualani Stream**
  - Limited hydrologic data
  - Geographical location uncertain
  - No biological surveys were conducted
  - Only known use - conduit for Lakini auwai system

Below Dam 2 at Waiokamilo Stream. Water is diverted into the Lakini auwai system

WAIOKAMILO

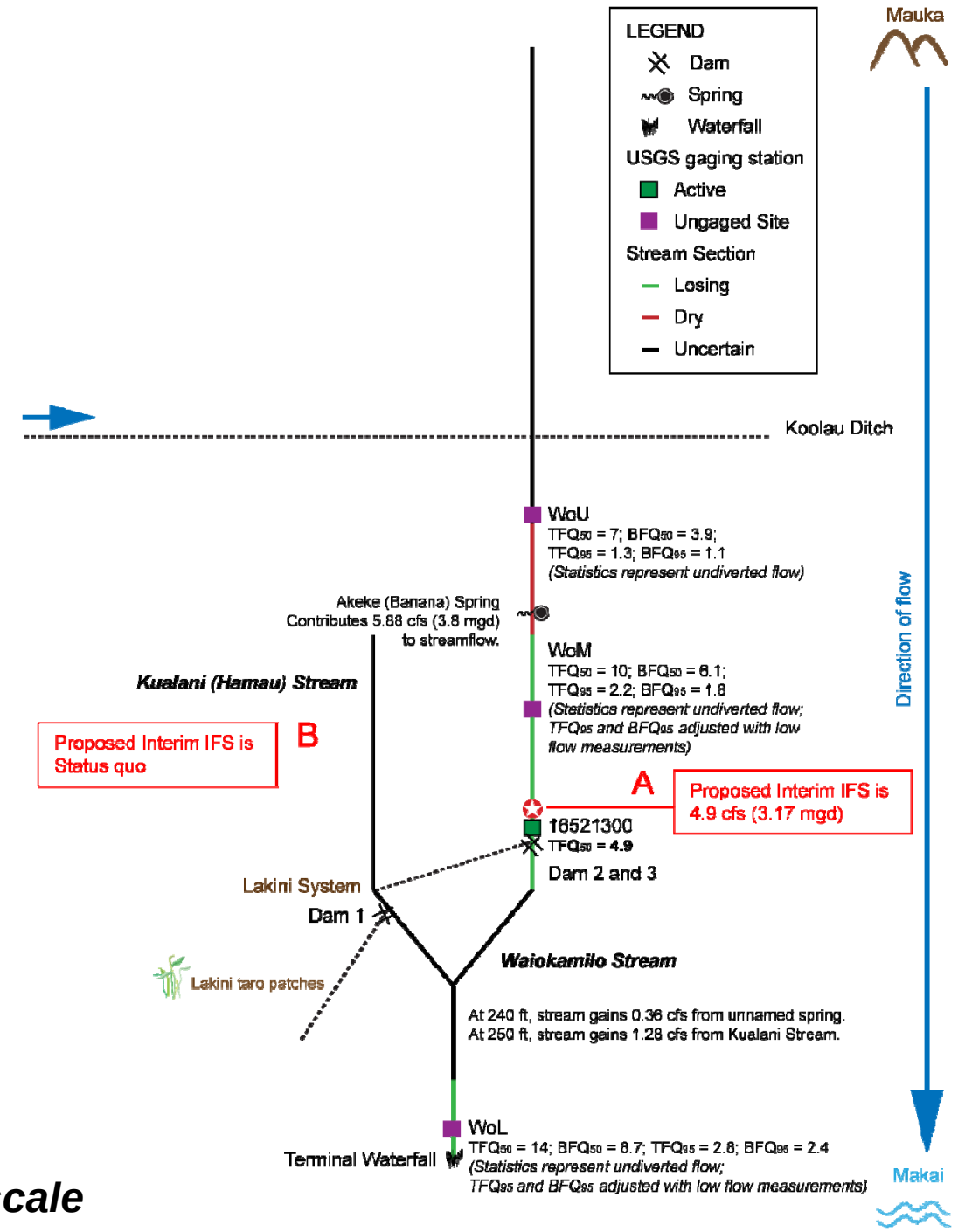


Diagram not to scale

Adaptive Management

- **Hydrologic Unit-Specific**
  - Reestablish control mechanism in auwai near Dam 2
  - Repair and maintain coffer dams upstream of Dam 3
  - Maintenance of auwai, transmission lines, and intakes
  - Flushing flows - auwai and taro loi
  - Monitor streamflow

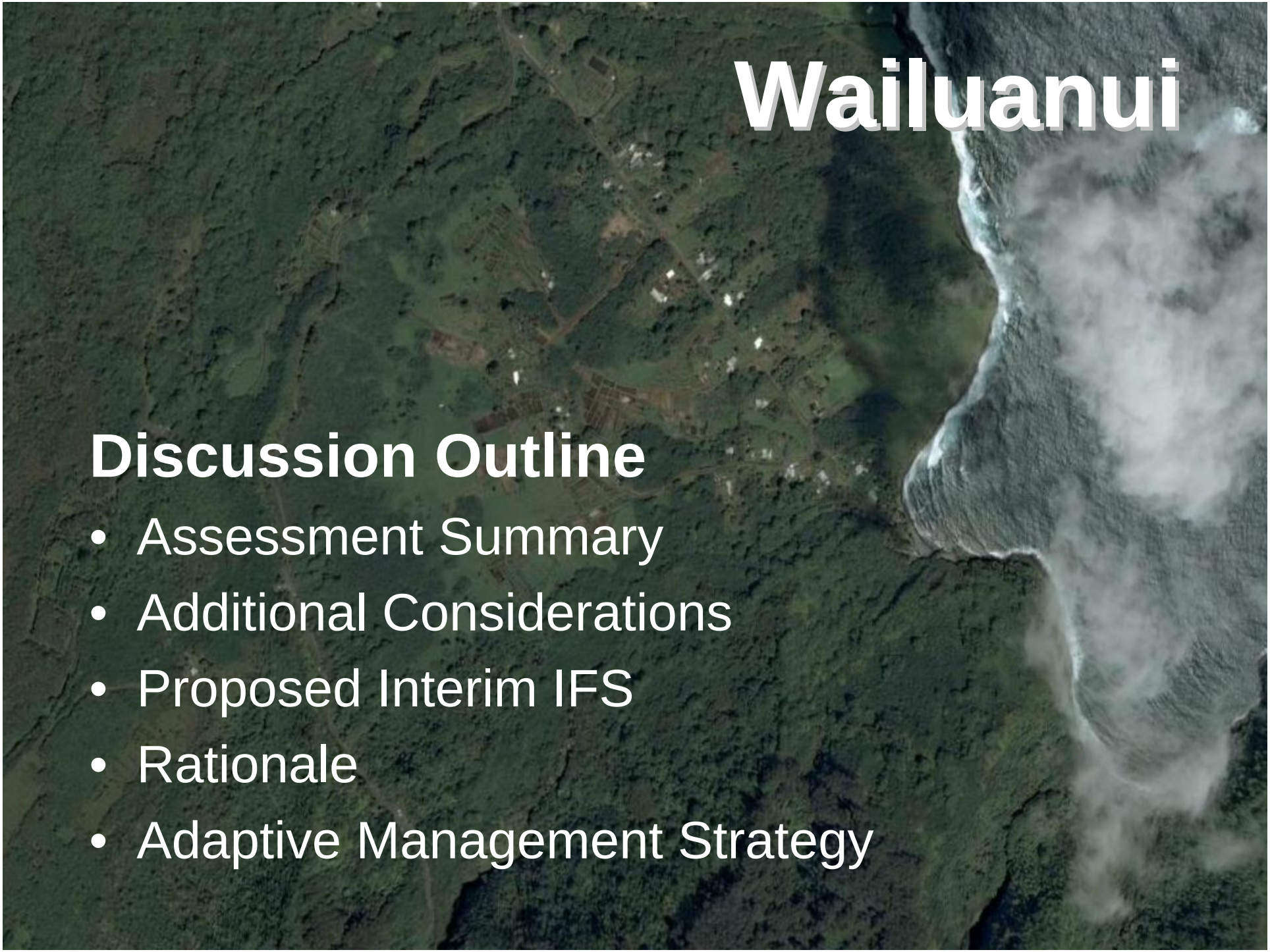
Waiokamilo Stream upstream of Dam 3

Adaptive Management

- **Hydrologic Unit-Specific**
  - Assess Kualani Stream
  - Assess amount of water for domestic use and stream biota

Dam 2 at Waiokamilo Stream, diverting water into the Lakini auwai system

- **General Strategies**
  - Implementation
  - Monitoring
  - Evaluation



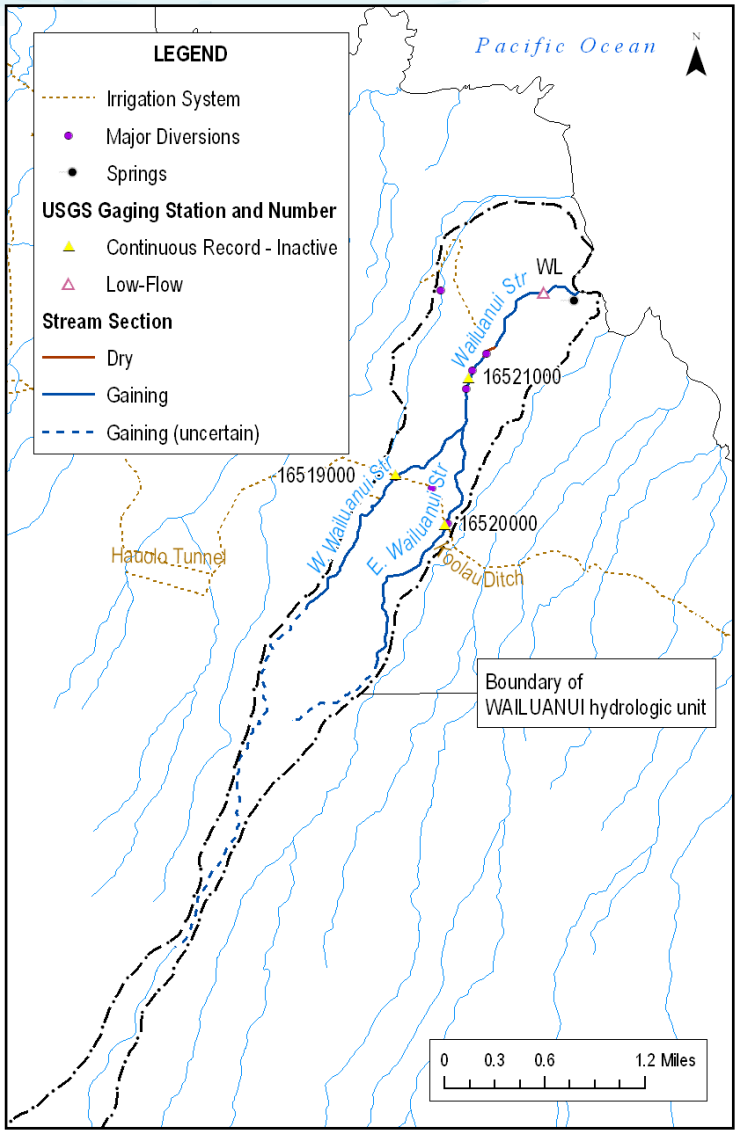
Wailuanui

Discussion Outline

- Assessment Summary
- Additional Considerations
- Proposed Interim IFS
- Rationale
- Adaptive Management Strategy

Assessment Summary

- **Hydrology**
  - Gaining stream
  - Ground water gain above ditch:
    - E. Wailuanui: 1.7 MGD
    - W. Wailuanui: 2.2 MGD
  - Ground water gain below ditch is 0.79 MGD
  - Data from regression equations (USGS)
  - Decreasing long-term trend in streamflow



MGD = million gallons per day

Assessment Summary

- **Fish and Wildlife**
  - Rich diversity
  - Lacks common introduced species
  - Larval recruitment
  - Lack of streamflow continuity
  - Deep pools and dewatered sections

Native Hawaiian snail: Hihiwai (Neritina granosa)

- **Recreational**
  - HSA – “Outstanding”
  - Swimming, hunting, fishing, scenic views

Assessment Summary

- **Ecosystem Maintenance**
  - 80% is part of Haleakala National Park, Koolau Forest Reserve, and Waikamoi Preserve
- **Aesthetic**
  - Wailua State Valley Wayside
  - Wailua Valley lookout
- **Water Quality**
  - Class 1b – “protective” conservation subzone

Wailuanui hydrologic unit

Assessment Summary

- **Irrigation and Domestic**
  - Total of 3 non-EMI diversions
  - 2 registered for cultivation of other crops and livestock
  - Keanae Well No. 1 - drinking water for Keanae and Wailuanui communities
- **Traditional and Customary**
  - 2 registered for taro cultivation
  - One of Wailuanui loi complexes relies on Wailuanui Stream

Wailua Valley

Assessment Summary

- **Noninstream**
  - EMI diversions - 4 major, 3 minor
  - EMI supplies water to:
    - HC&S
    - Makawao DWS system
    - MLP
  - Effects of decreasing water diverted
    - Irrigation in west and central Maui
    - Long-term trends in ground water levels

EMI diversion at Koolau Ditch, Wailuanui Stream

Additional Considerations

- **Public testimony**
  - Lack of water
  - Family had to move

Waikani Falls, Wailuanui Stream

- **HC&S**
  - Pipe intake for taro damaged by landslide
  - Questions the need to amend interim IFS

Rationale

- **Why restore flow?**
  - Increase flow continuity for stream biota
  - Support robust native species-dominated community
  - Protection and maintenance of reserves and preserves
  - Taro farmers and domestic users in Wailua Valley
  - Future demand

Mouth of Wailuanui Stream

Rationale

- **Why not full restoration?**
  - Upcountry Maui - domestic use, agriculture
  - Central Maui - agriculture
  - Power to MECO
  - Sustainability - diversified agriculture

Maui Electric Company (MECO)

Rationale

- **Interim IFS**
  - Estimate: Based on median natural base flow (BFQ_{50})
  - Purpose: Water for taro farmers and stream biota

Wailuanui Stream

WAILUANUI

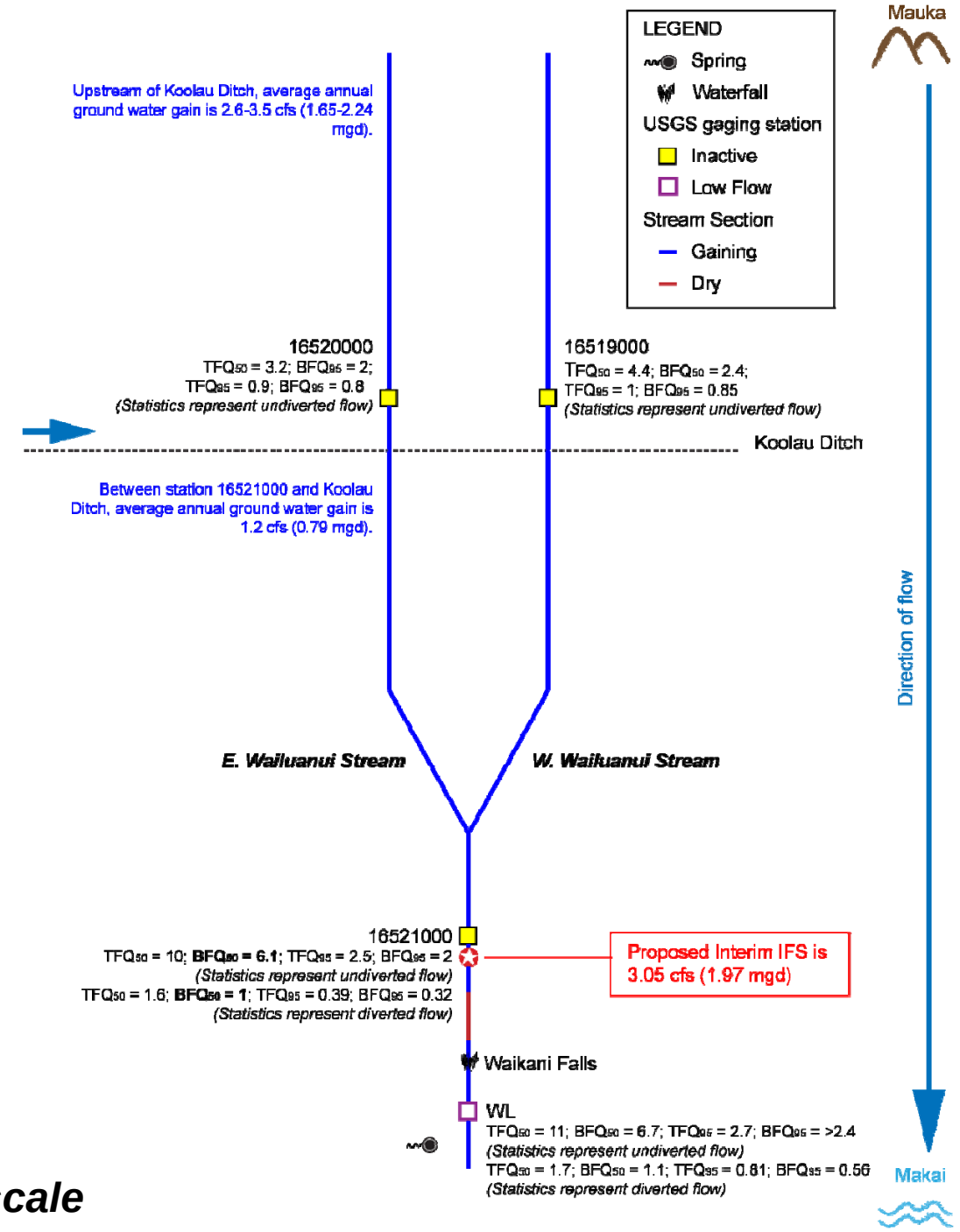


Diagram not to scale

Proposed Interim IFS

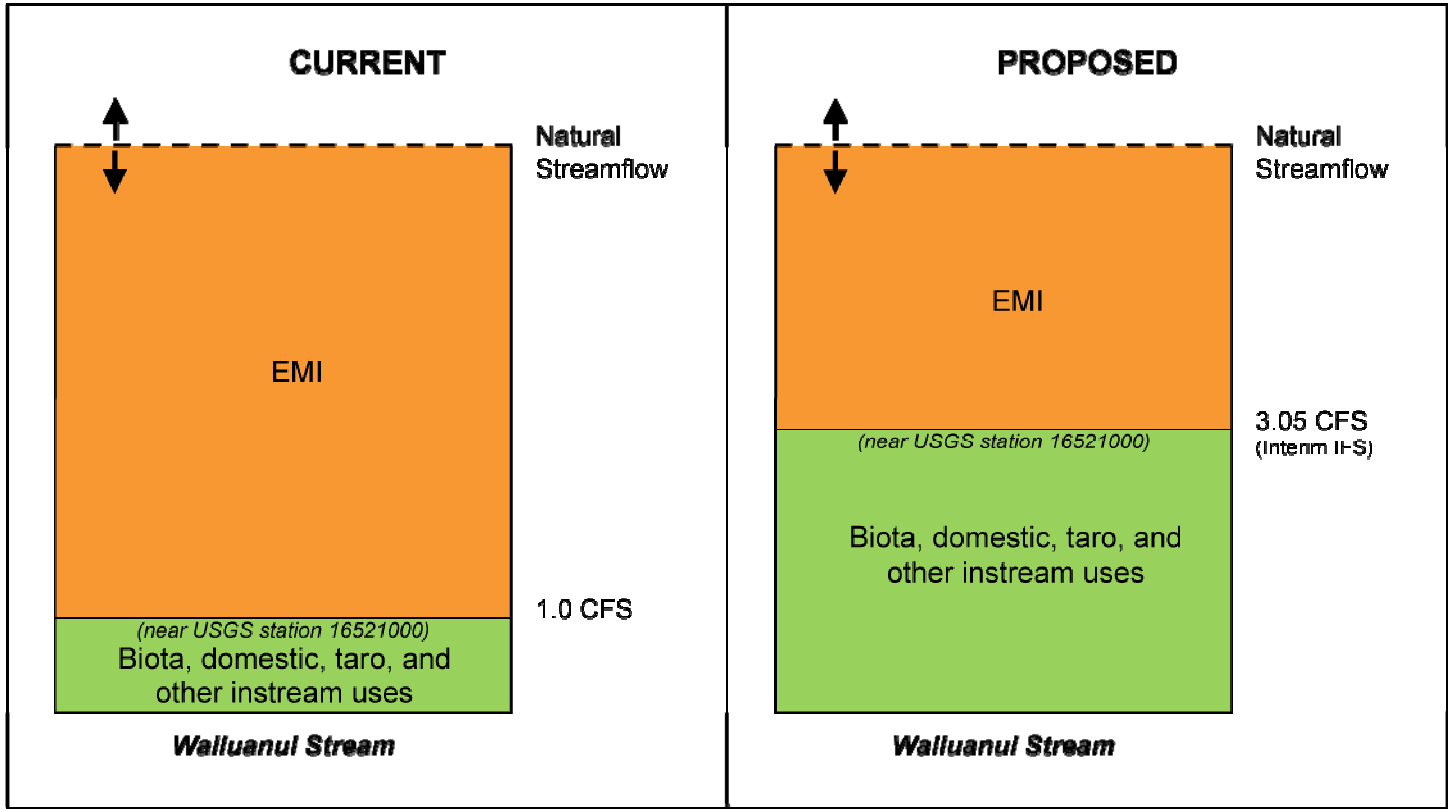


Diagram not to scale

Adaptive Management

- **Hydrologic Unit-Specific**
  - Maintenance of auwai, transmission lines, and intakes
  - Flushing flows for auwai and taro loi
  - Monitor streamflow downstream of Waikani Falls

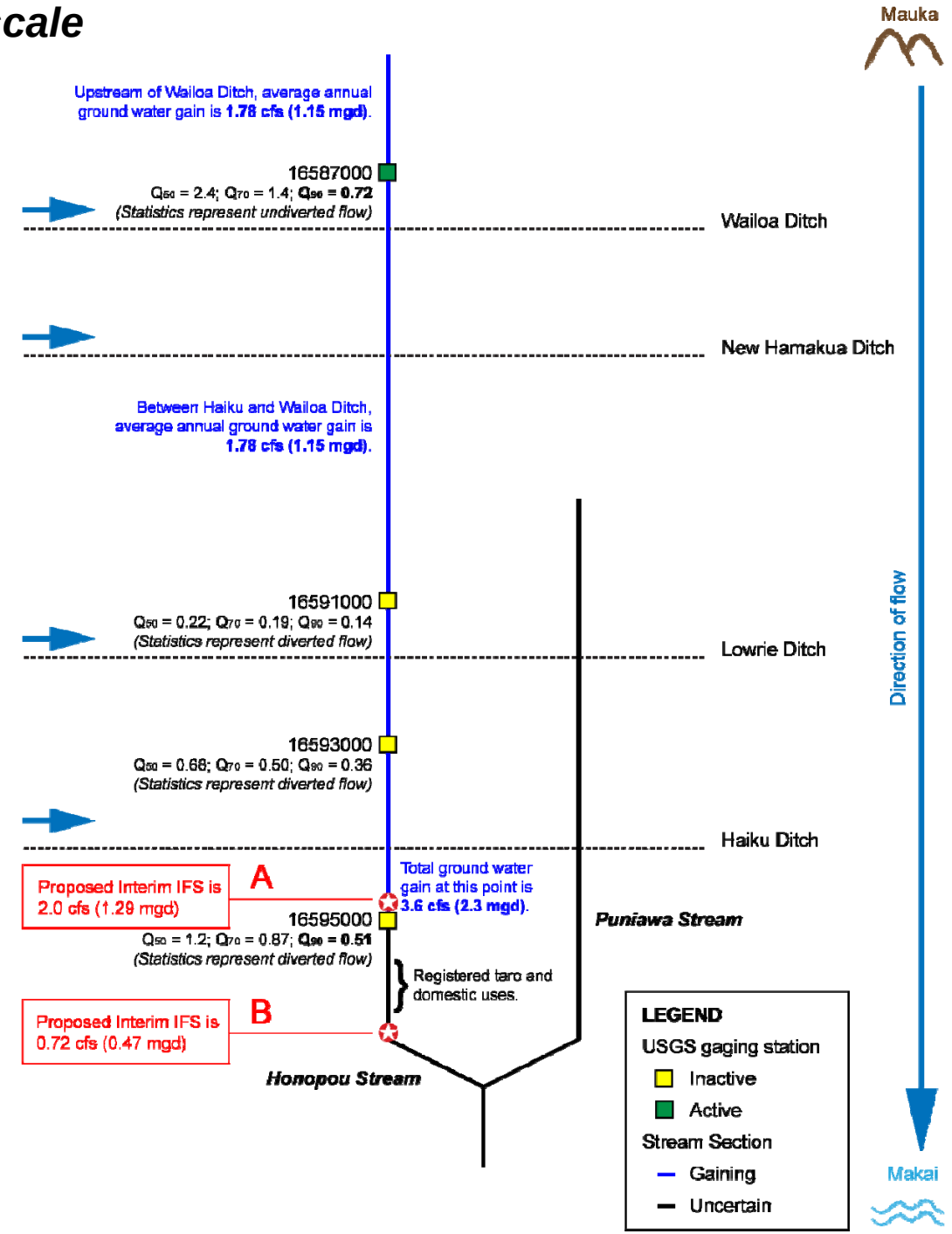
Taro loi in Wailua Valley

- **General Strategies**
  - Implementation
  - Monitoring
  - Evaluation

RECOMMENDATIONS

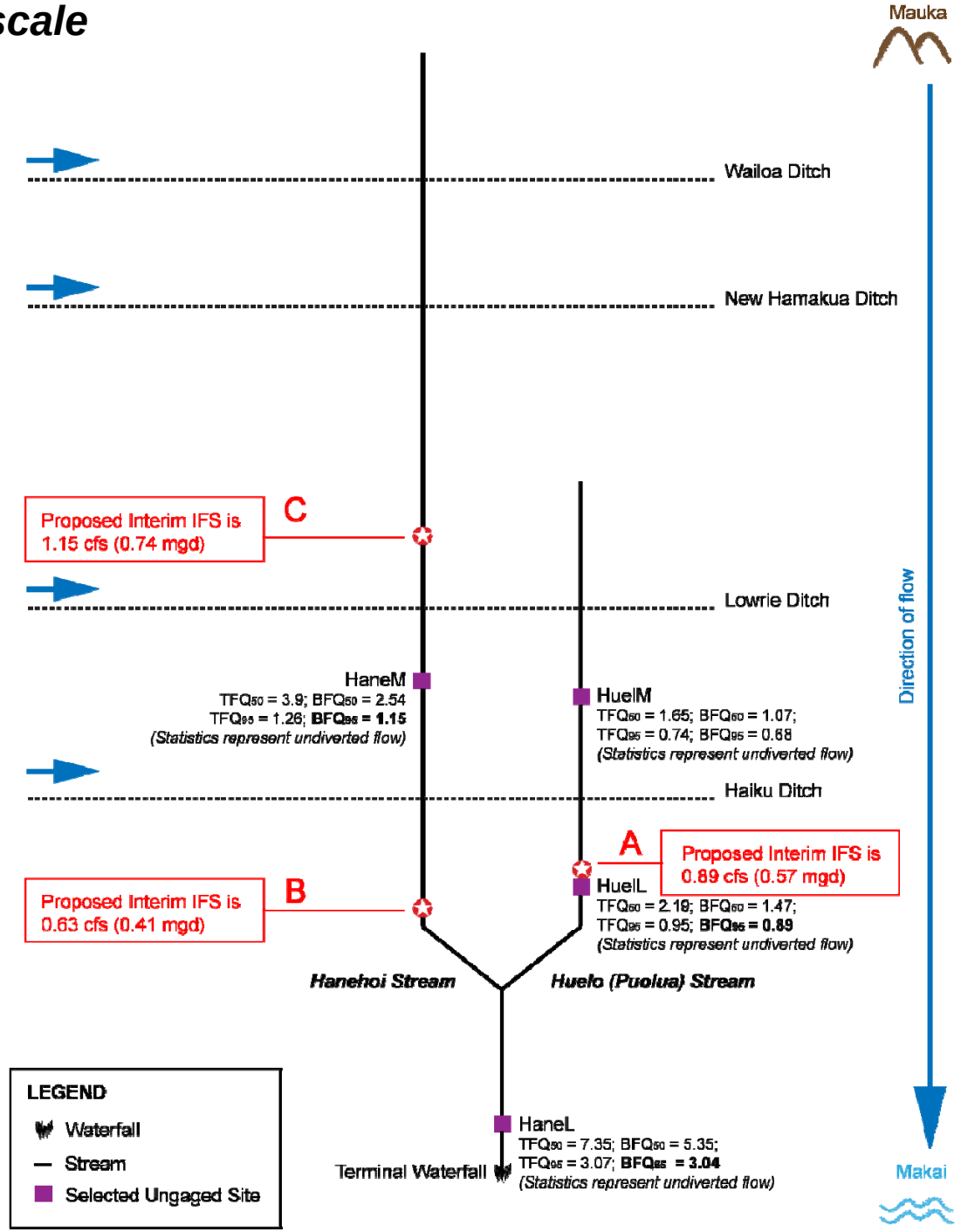
HONOPOU

Diagram not to scale



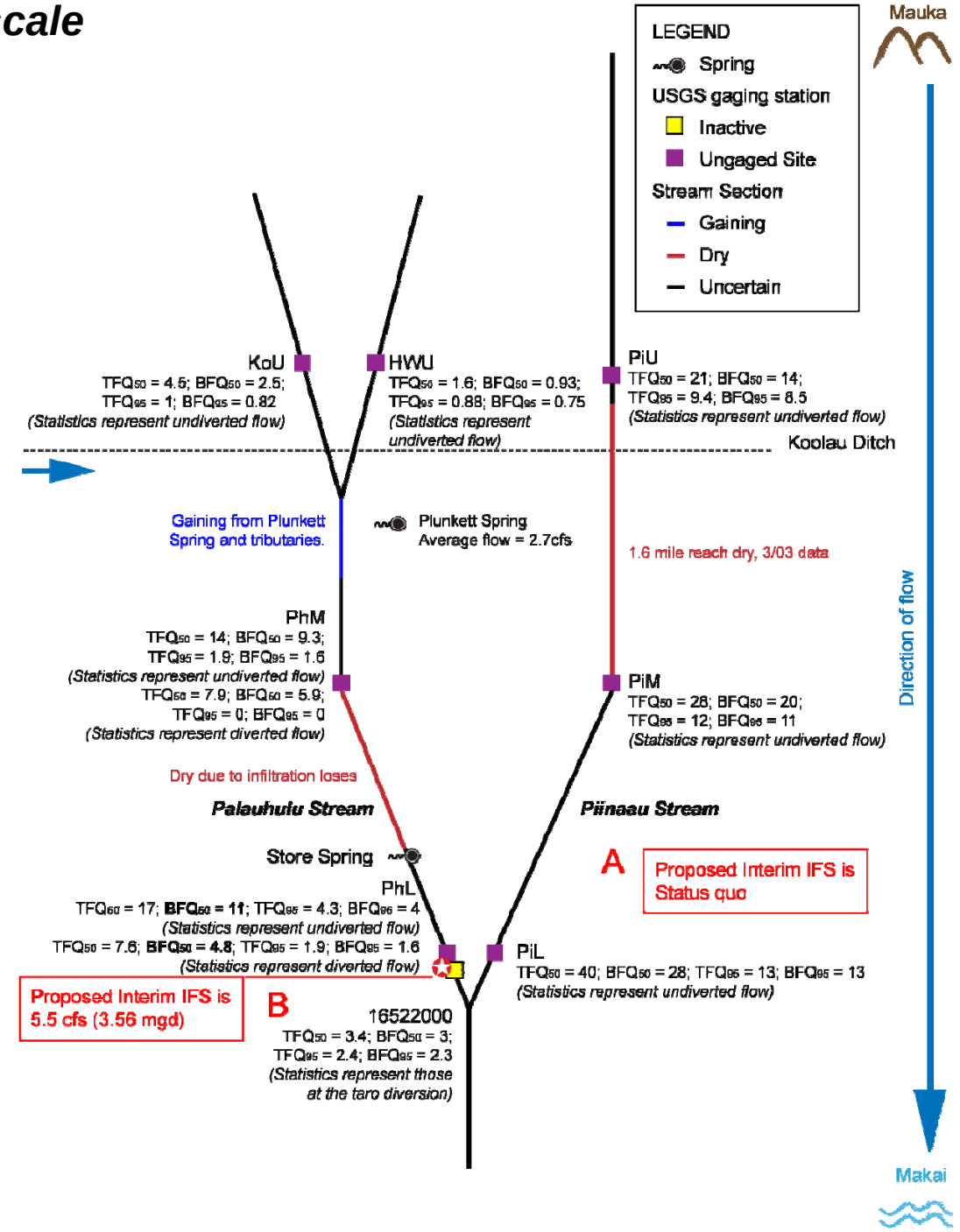
HANEHOI

Diagram not to scale



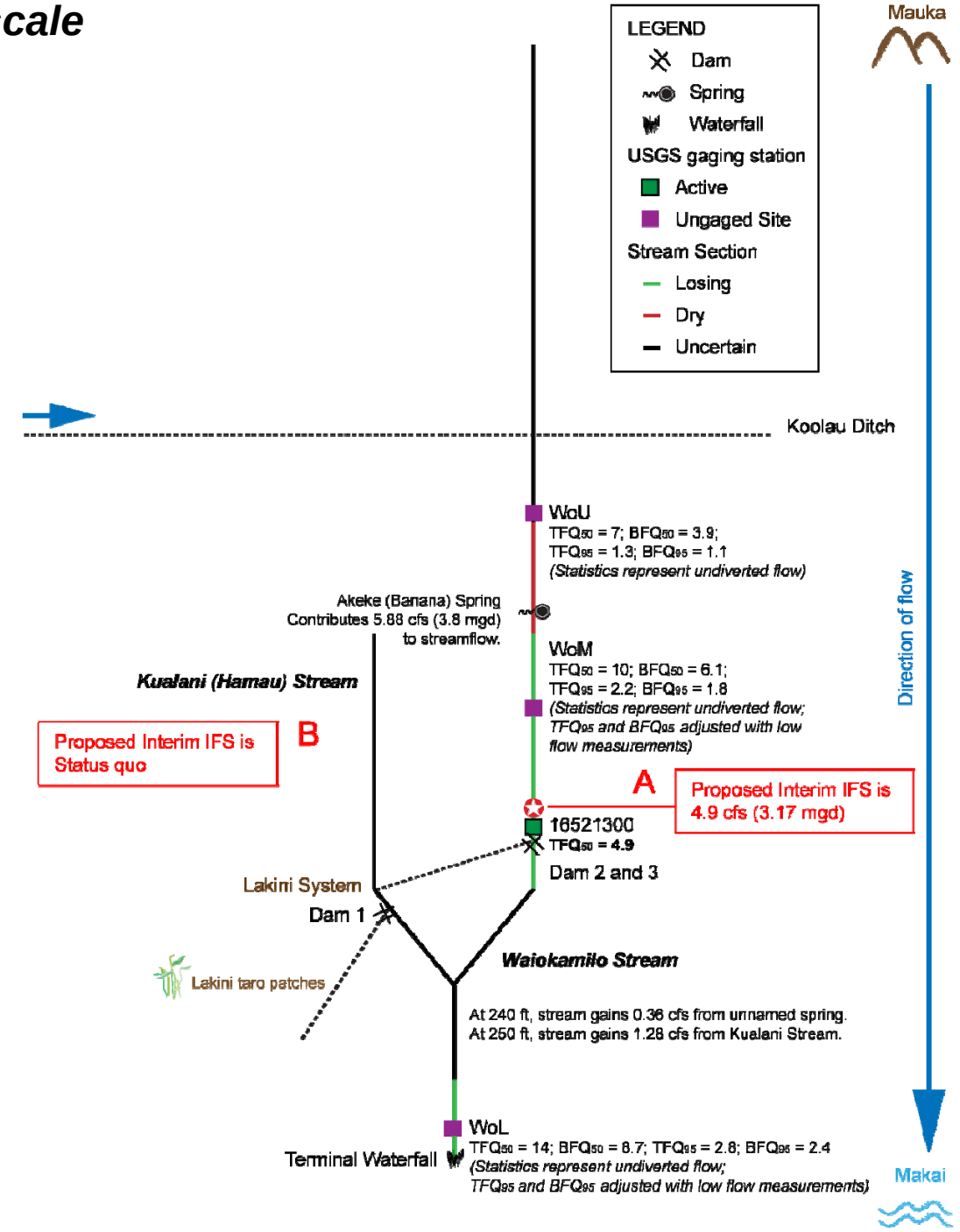
PIINAAU

Diagram not to scale



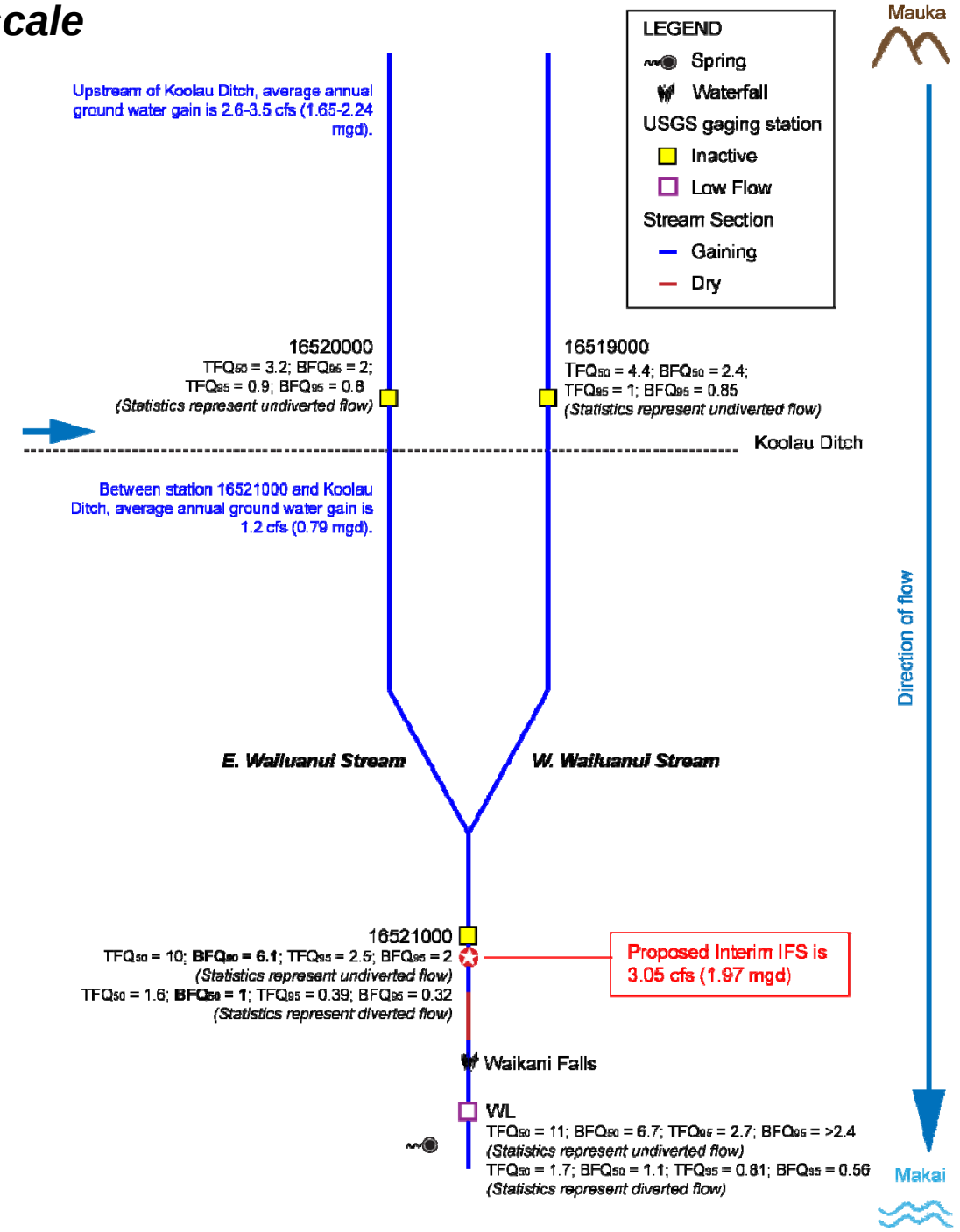
WAIOKAMILO

Diagram not to scale



WAILUANUI

Diagram not to scale



RECOMMENDATIONS

- **General Strategies**
  - Implementation
    - Comply with State Water Code for unregistered diversions
    - Collaborate with agency staff and registered diversion owners to determine appropriate actions
    - Coordinate with EMI and DAR to assess existing conditions and status of EMI diversions

RECOMMENDATIONS

- **General Strategies**
  - Monitoring
    - Monitor streamflow by taking periodic measurements
    - Conduct periodic biological surveys
    - Affected parties monitor and document the negative impacts of diversions or adopted interim IFS
    - Conduct investigations with granted access to stream channels and private property

RECOMMENDATIONS

- **General Strategies**
  - Evaluation
    - Report to Commission within one year from date of adoption
    - Assess implementation of adaptive management strategies
    - Prepare long-term management framework

Questions?


Ke Kahuwai Pono
"The trustee who oversees the rightful sharing of water."

Extra Slides

Proposed Interim IFS

- **Interim IFS A**
  - Location: Lower reach of Honopou Stream near USGS gaging station, downstream of Haiku Ditch.
  - Standard: 2.00 CFS, 1.29 MGD

- **Interim IFS B**
  - Location: Lower reach of Honopou Stream, downstream of the lowest registered diversion.
  - Standard: 0.72 CFS, 0.47 MGD

CFS = cubic feet per second; MGD = million gallons per day

Proposed Interim IFS

- **Interim IFS A**
  - Location: Lower reach of Huelo Stream, downstream of Haiku Ditch.
  - Standard: 0.89 CFS, 0.57 MGD
- **Interim IFS B**
  - Location: Lower reach of Hanehoi Stream, downstream of Haiku Ditch.
  - Standard: 0.63 CFS, 0.41 MGD
- **Interim IFS C**
  - Location: Lower reach of Hanehoi Stream, upstream of Lowrie Ditch.
  - Standard: 1.15 CFS, 0.74 MGD

CFS = cubic feet per second; MGD = million gallons per day

Proposed Interim IFS

- **Interim IFS A**
  - Location: Lower reach of Piinaau Stream near 40 feet elevation, upstream from the confluence of Piinaau and Palauhulu Streams. This is the location of the USGS ungaged site, station PiL.
  - Standard: Status quo

- **Interim IFS B**
  - Location: Lower reach of Palauhulu Stream near 80 feet elevation, upstream from the confluence of Piinaau and Palauhulu Streams. This is the location of the USGS ungaged site, station PhL.
  - Standard: 5.50 CFS, 3.56 MGD

CFS = cubic feet per second; MGD = million gallons per day

Proposed Interim IFS

- **Interim IFS A**
  - Location: Lower reach of Waiokamilo Stream at the location of the USGS gaging station #16521300 near Dam 3. This location is downstream of Koolau Ditch, but upstream of the confluence of Waiokamilo and Kualani (Hamau) Streams.
  - Standard: 4.90 CFS, 3.17 MGD

- **Interim IFS B**
  - Location: Lower reach of Kualani (Hamau) Stream, upstream from its confluence with Waiokamilo Stream and downstream from Dam 1.
  - Standard: Status quo

CFS = cubic feet per second; MGD = million gallons per day

Proposed Interim IFS

- **Interim IFS**
  - Location: Lower reach of Wailuanui Stream near the inactive USGS gaging station #16521000 at 620 feet elevation. This location is downstream of Koolau Ditch, below the confluence of the tributaries, East and West Wailuanui Streams.
  - Standard: 3.05 CFS, 1.97 MGD

CFS = cubic feet per second; MGD = million gallons per day

General Recommentations

- Implementation
- Monitoring
- Evaluation