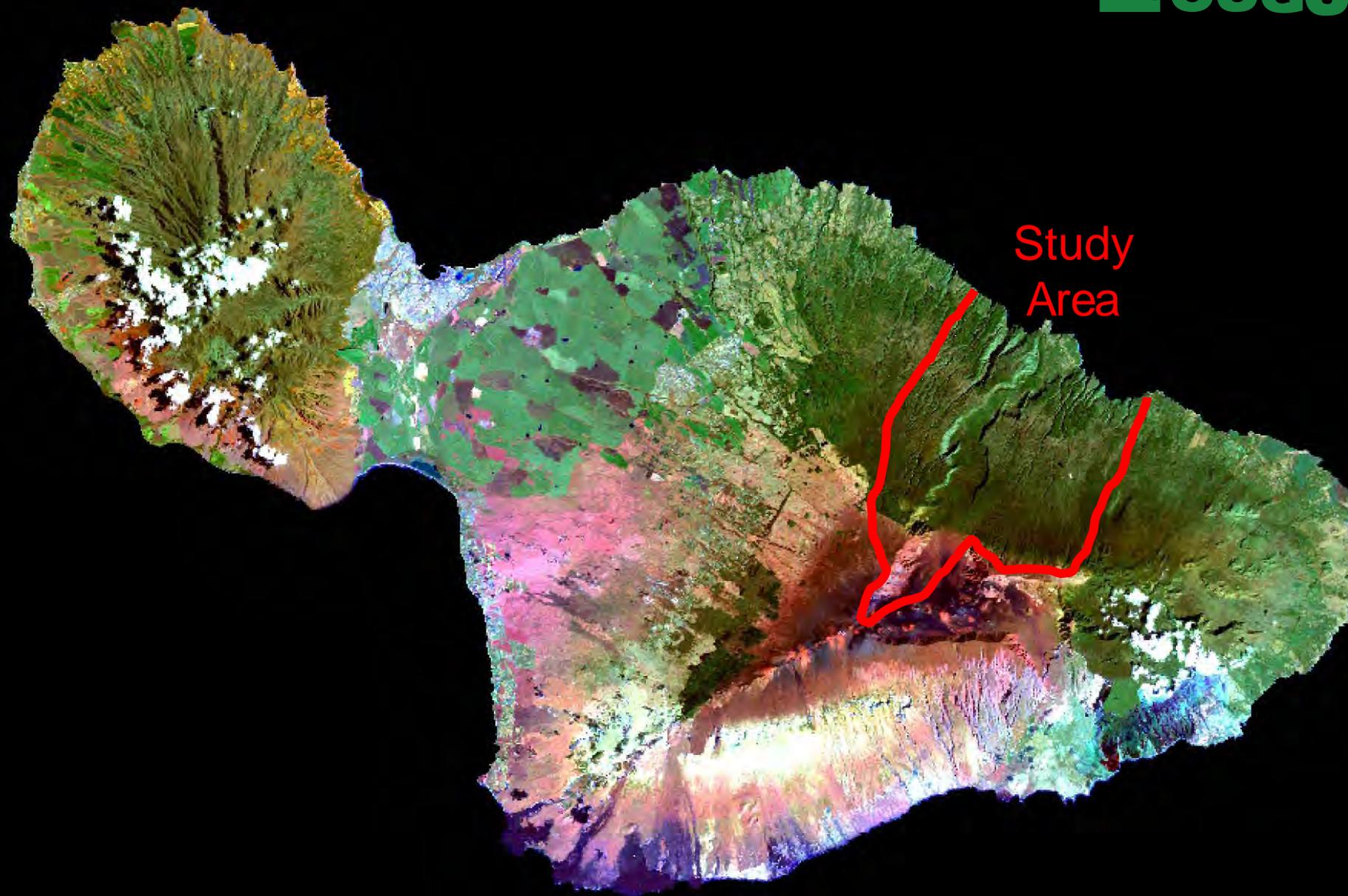


Streamflow and Aquatic Species Habitat Studies, Northeast Maui, Hawaii



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May 20, 2008 Hawaii Stream/Riparian Workshop



Study
Area

PROBLEM: Competition for limited resource



Large-scale agriculture



Aesthetics



Native species



Domestic supply



Cultural practices

Project Approach

1. Estimate current and pre-diversion flows for streams
2. Assess effects of diversions on flow and water temperature
3. Determine aquatic-species abundance, distribution, and habitat preference
4. Estimate effects of flow restoration on habitat availability for native macrofauna

**Provides input to technically based instream-flow standards
for northeast Maui**

Collaborators

US Geological Survey

Commission on Water Resource Management

Maui Department of Water Supply

Board of Land and Natural Resources

East Maui Irrigation Co., Ltd.

OBJECTIVES

Assess effects of diversions on streamflow



Estimate effects of flow restoration on habitat availability for native macrofauna



Effects of diversions on streamflow

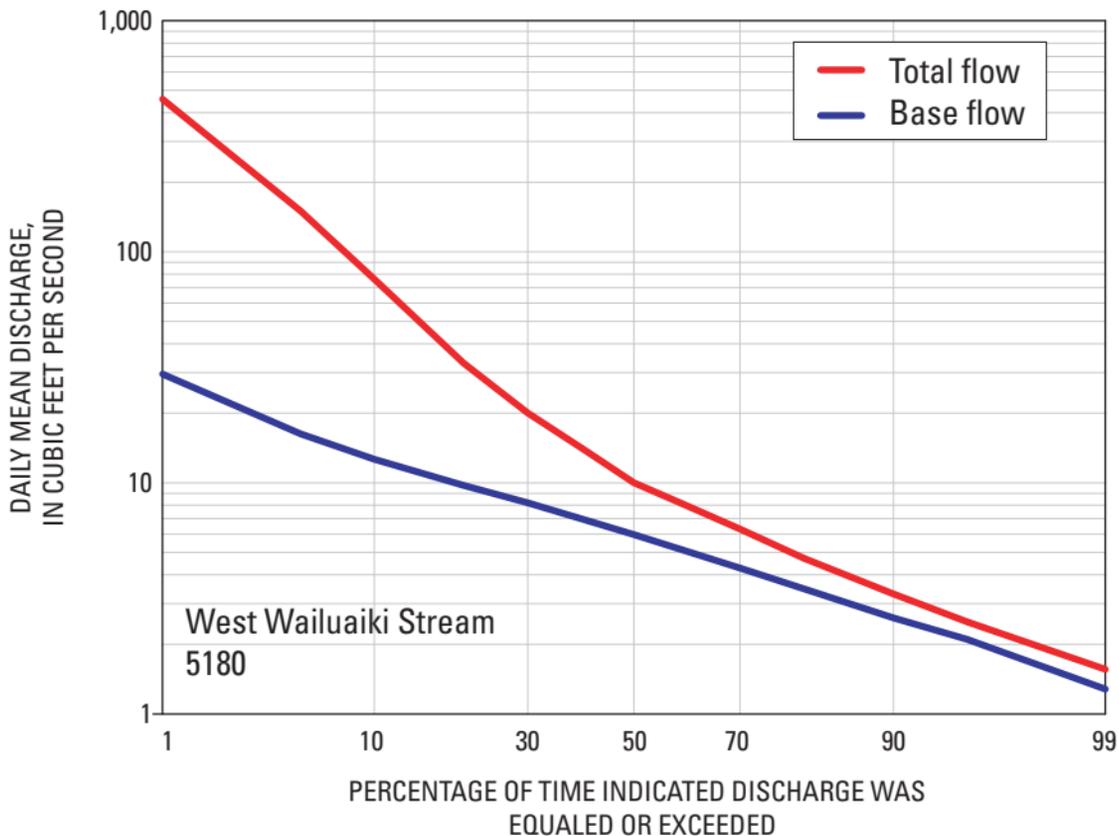
Compute flow statistics at gaged sites

Quantify drainage-basin characteristics at these sites

Develop regional regression equations to estimate flow statistics for ungaged sites

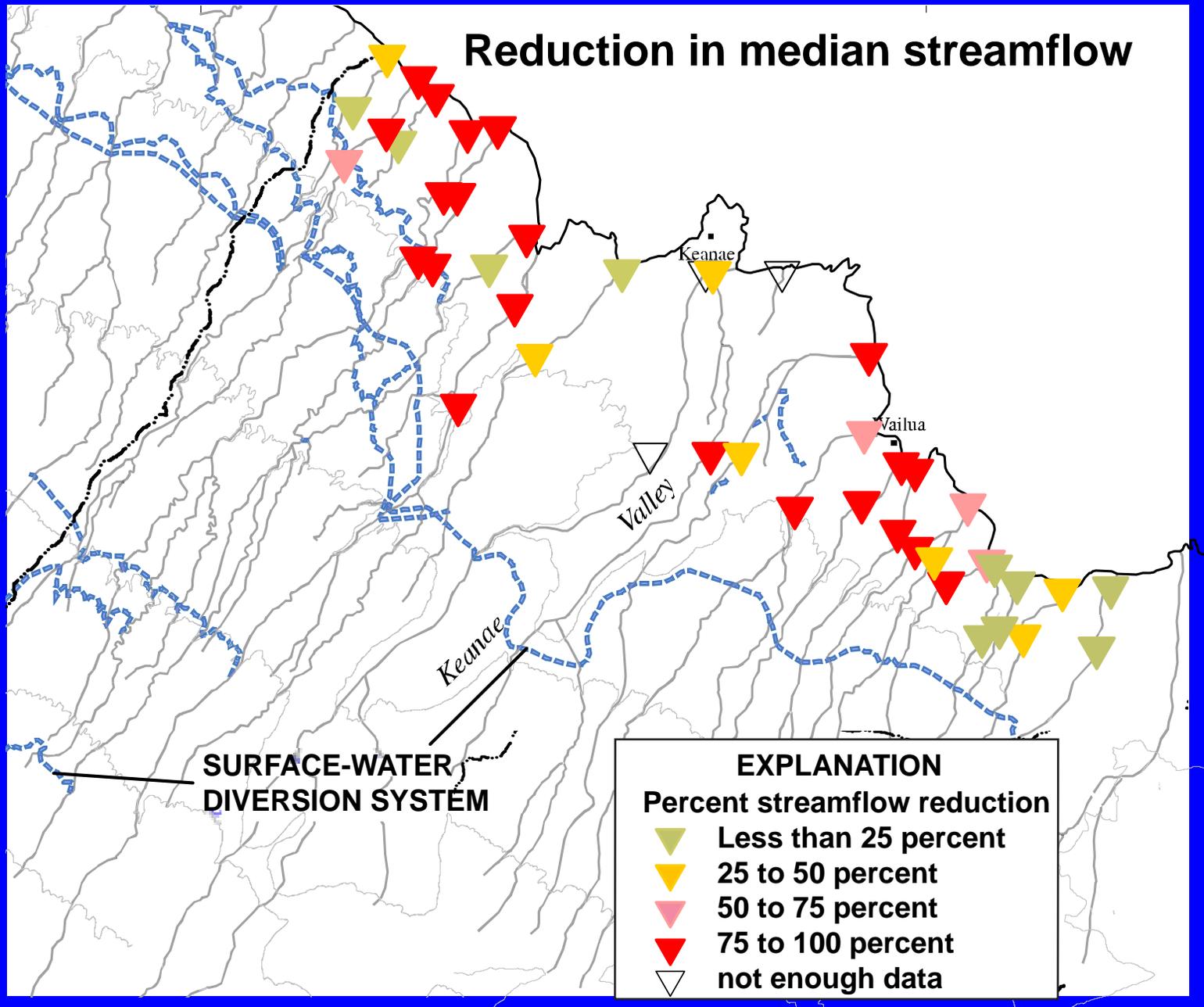
Enhance results using field measurements

Natural and diverted flow estimates for each stream in study area



Flow-duration curves of total streamflow and base flow at gaging station 5180 on West Wailuaiki Stream, northeast Maui, Hawaii, for period 1914-2002.

Reduction in median streamflow



**SURFACE-WATER
DIVERSION SYSTEM**

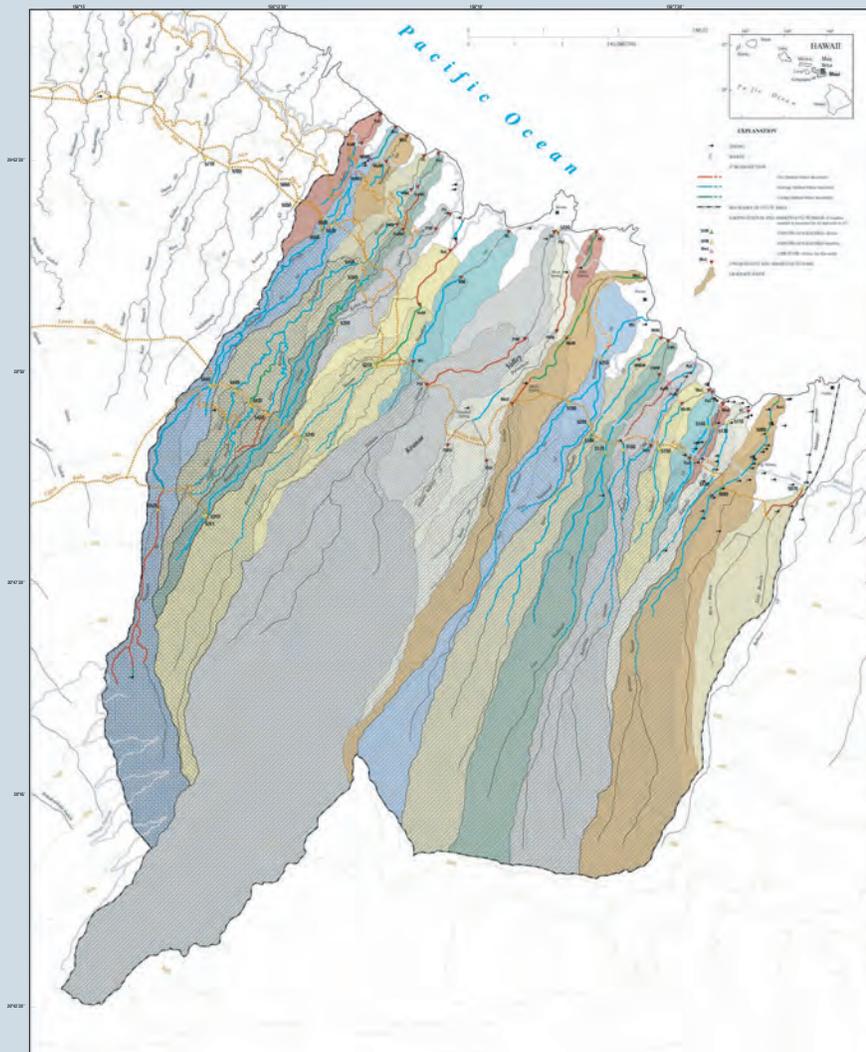
EXPLANATION

Percent streamflow reduction

- Light Green: Less than 25 percent
- Yellow: 25 to 50 percent
- Pink: 50 to 75 percent
- Red: 75 to 100 percent
- White: not enough data

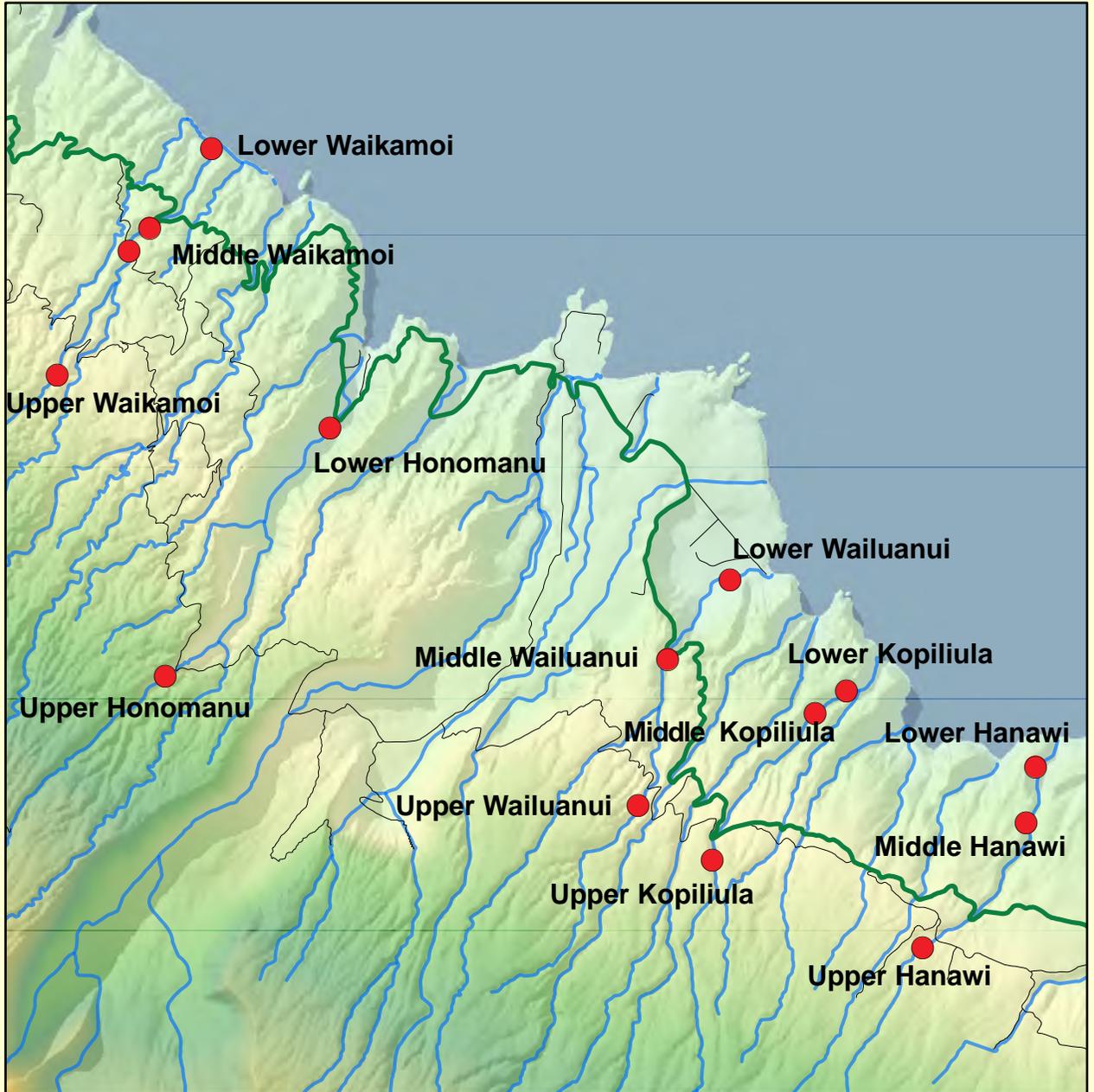
Prepared in cooperation with the
State of Hawaii Commission on Water Resource Management

Median and Low-Flow Characteristics for Streams under Natural and Diverted Conditions, Northeast Maui, Hawaii



Scientific Investigations Report 2004-5262

Northeast Maui intensively studied reaches



Biological Methods



7 Streams - 17 Sites - 146 Transects

3 reaches per stream

7-10 cross sections per reach

5,566 total quadrats

Record all species present

4,907 total individuals

Fish: nopili, nakea, & alamo'o

Shellfish: hihiwai

Shrimp: mountain opae

**Measure habitat variables
associated with macrofauna**

**Substrate, depth, velocity, flow
regime, distance from edge**

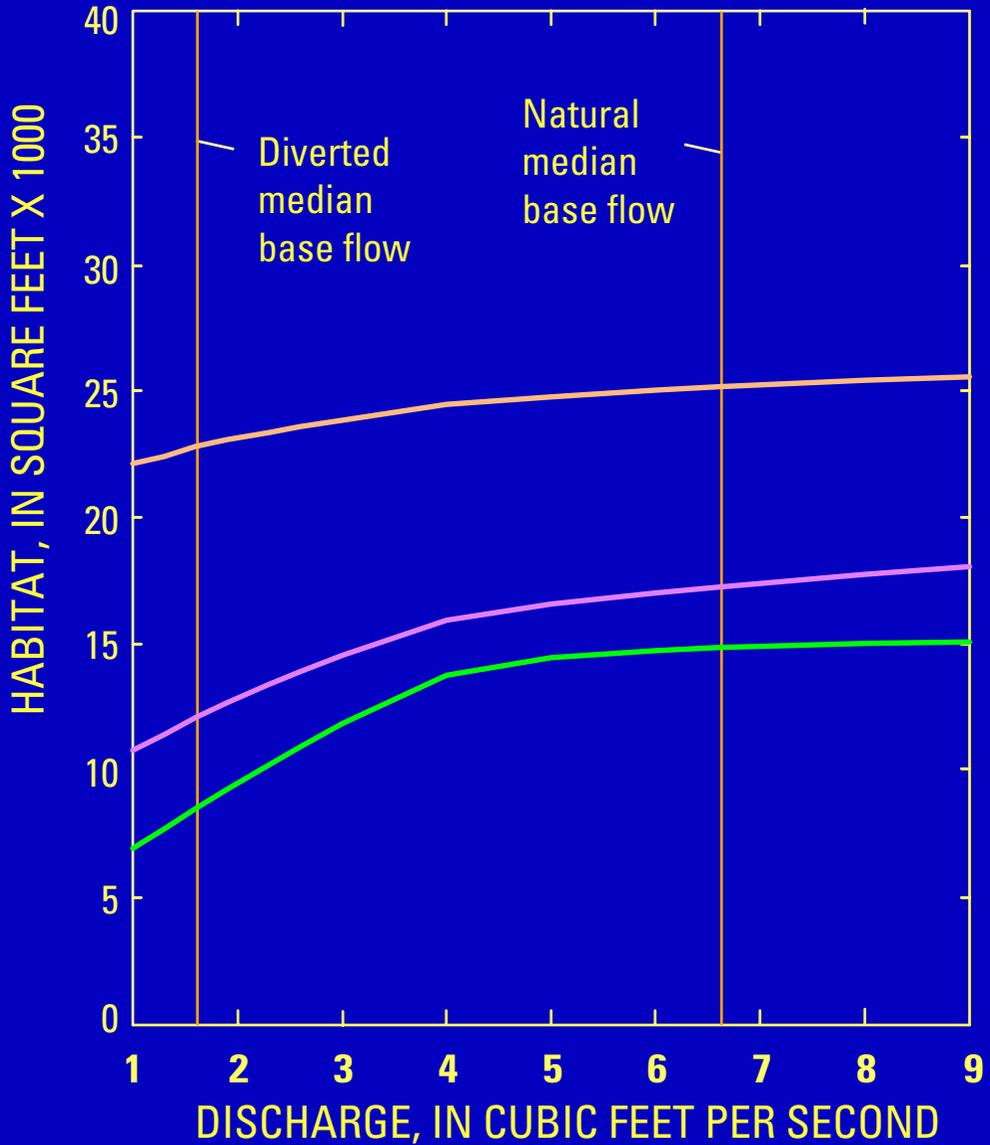


Effects of diversions on habitat availability

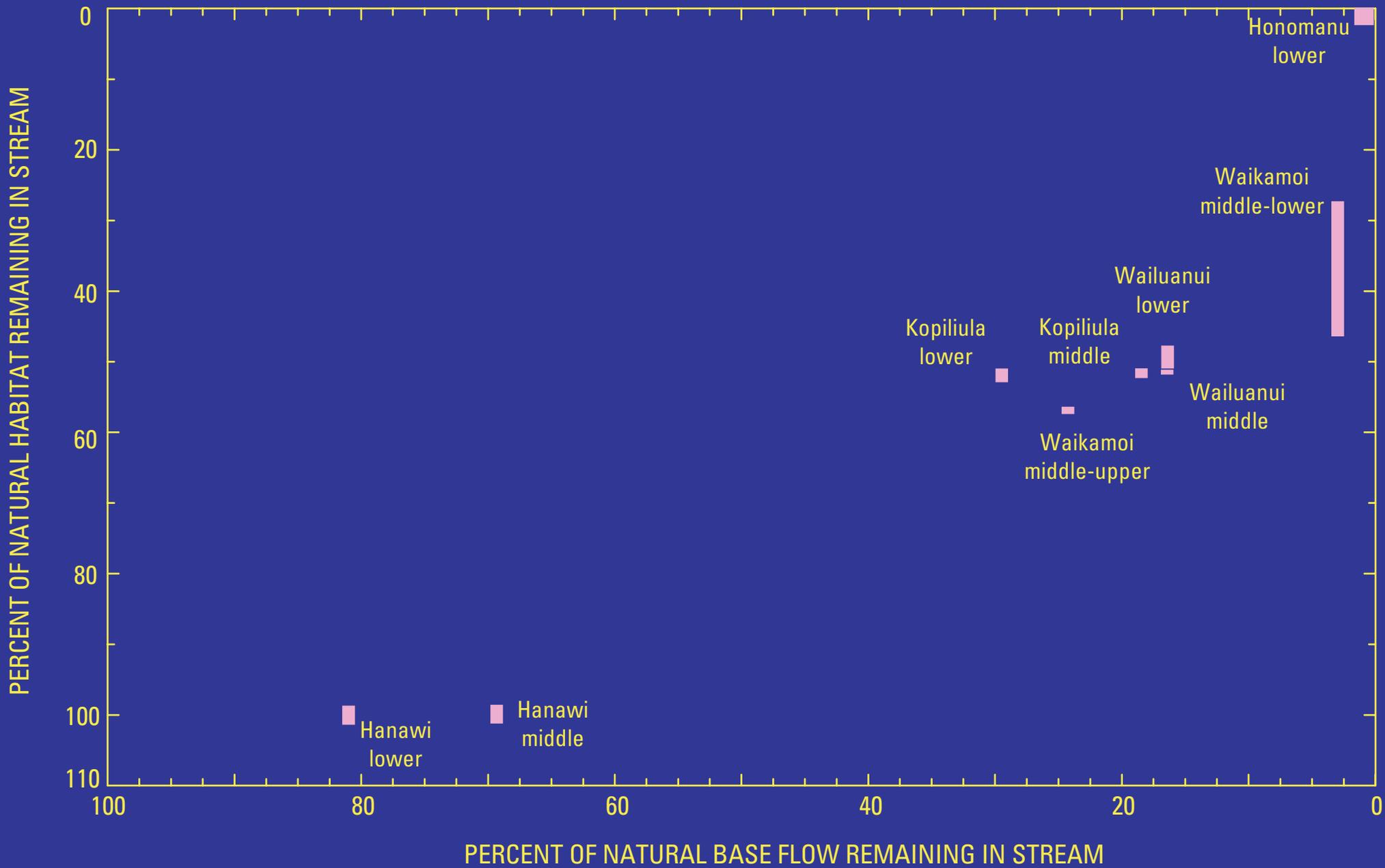
- Determine habitat and species suitability at representative stream reaches
- Estimate habitat for a range of flows using PHABSIM
 - model depth, velocity, and substrate at transects
 - relate biology using habitat suitability curves
- Develop regional relation between flow and habitat for study-area streams

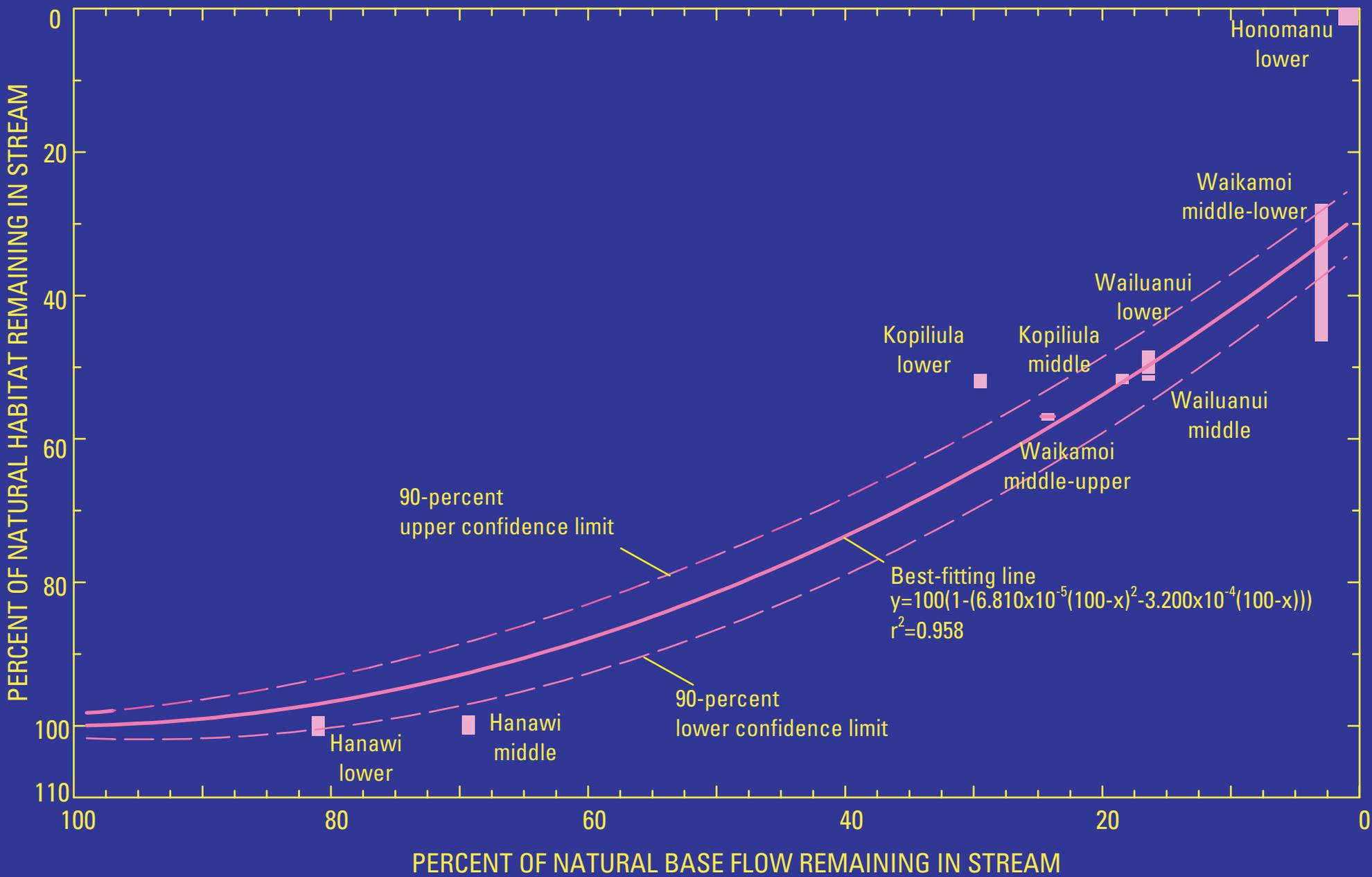
Produce estimates of habitat restoration as flow varies from diverted to natural conditions

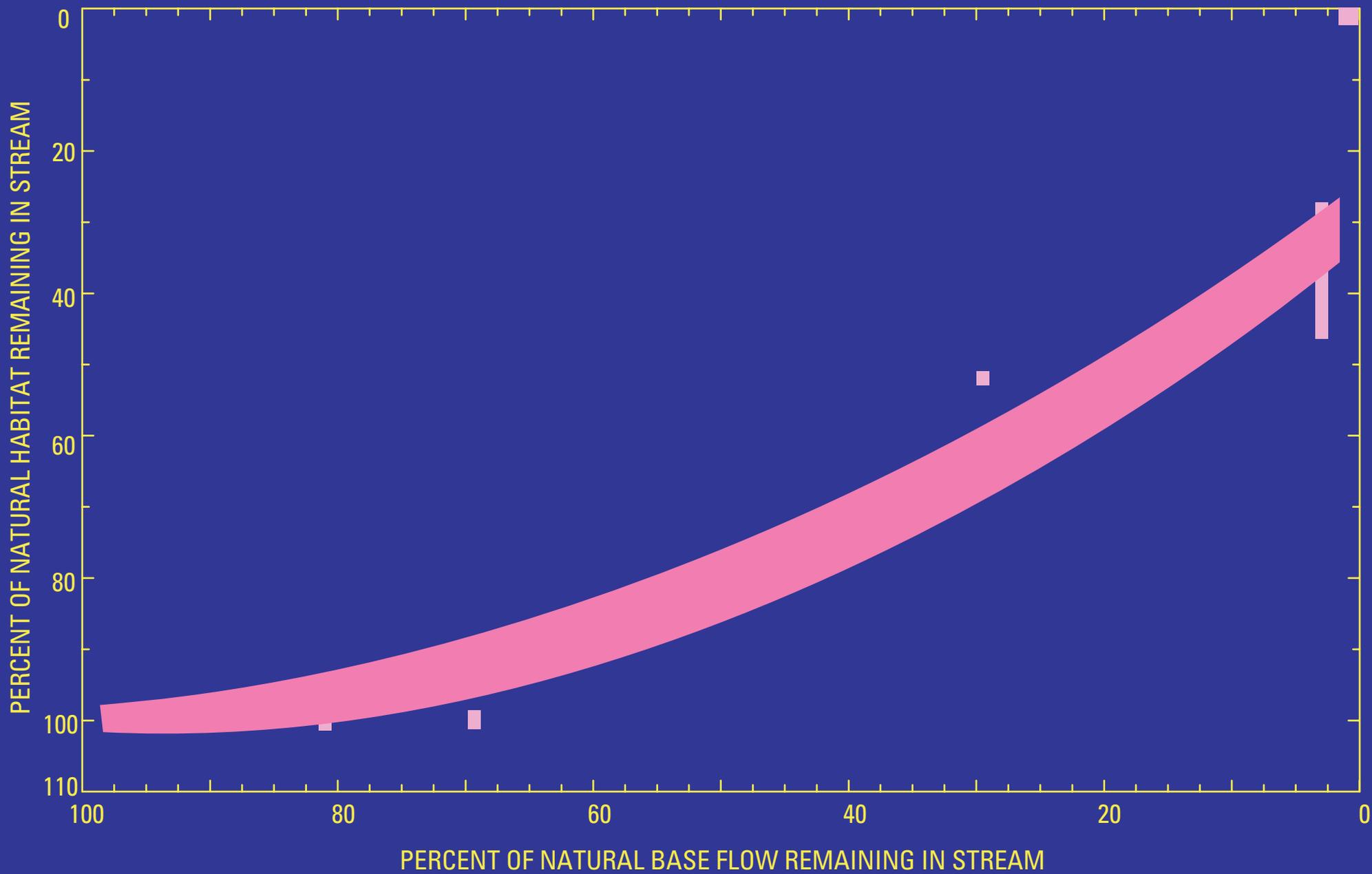
Waikamoi middle-upper

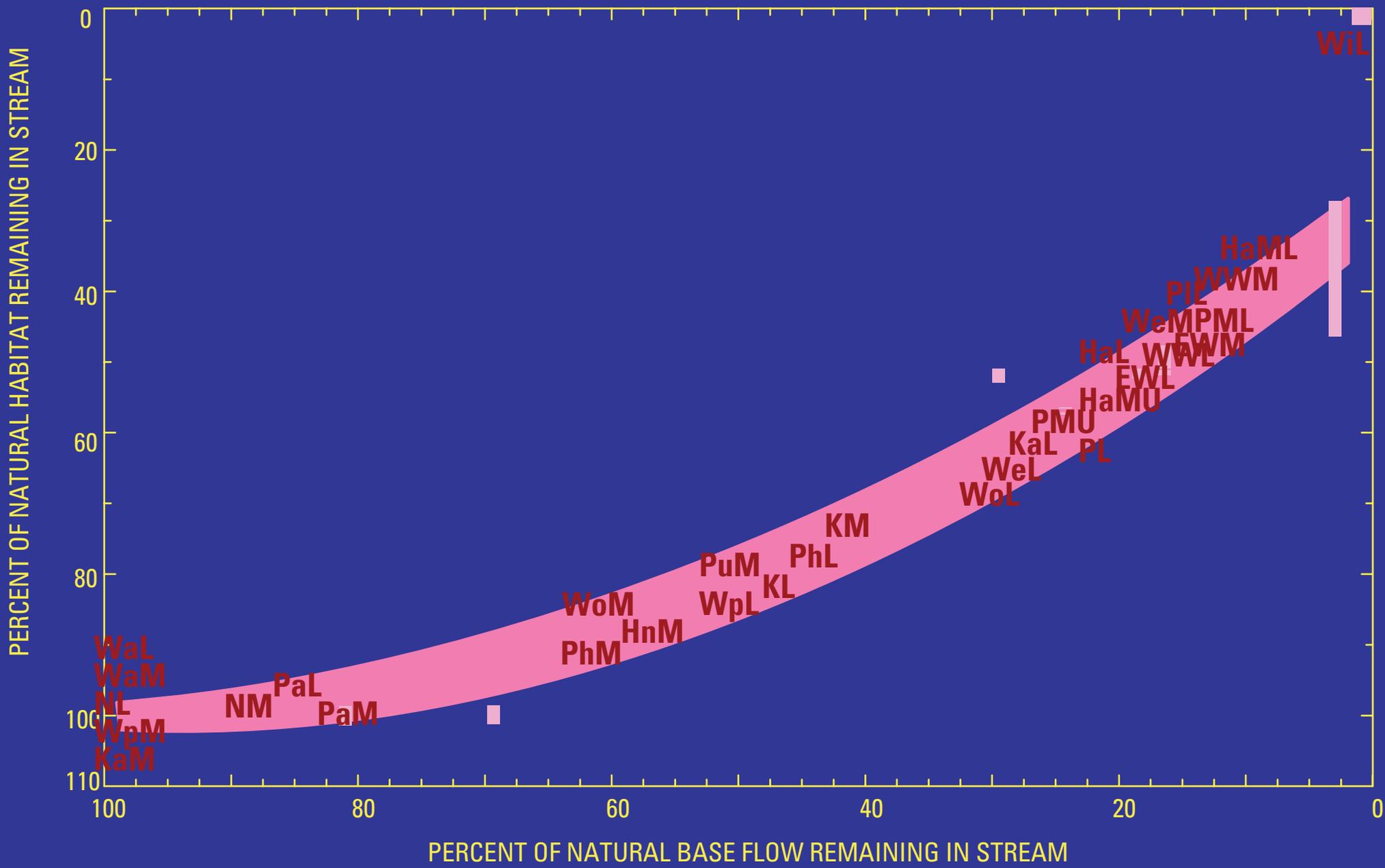


- TOTAL AREA AVAILABLE
- USABLE AREA AVAILABLE
- Alamoo
- Opae









Prepared in cooperation with the State of Hawaii Department of Land and Natural Resources
Commission on Water Resource Management

Effects of Surface-Water Diversions on Habitat Availability for Native Macrofauna, Northeast Maui, Hawaii

Scientific Investigations Report 2005-5213

SUMMARY

**First report provides natural and diverted
flow estimates**



Defines upper limits on instream flows

**Second report provides information on how
habitat availability changes with flow**



**Quantifies one component of many
competing beneficial uses**

