

Use of IKONOS and Landsat to Estimate Size
of Mosquito Habitat for Malaria Control in
South Korea

by

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Importance of study

- South Korea declared malaria-free in 1970's
- Disease re-emerged in 1993; has grown geometrically since.
- Focus is border between North and South Korea
- About 80 cases in American military
- Potential for re-introduction to U.S.

Which disease control method is least expensive?

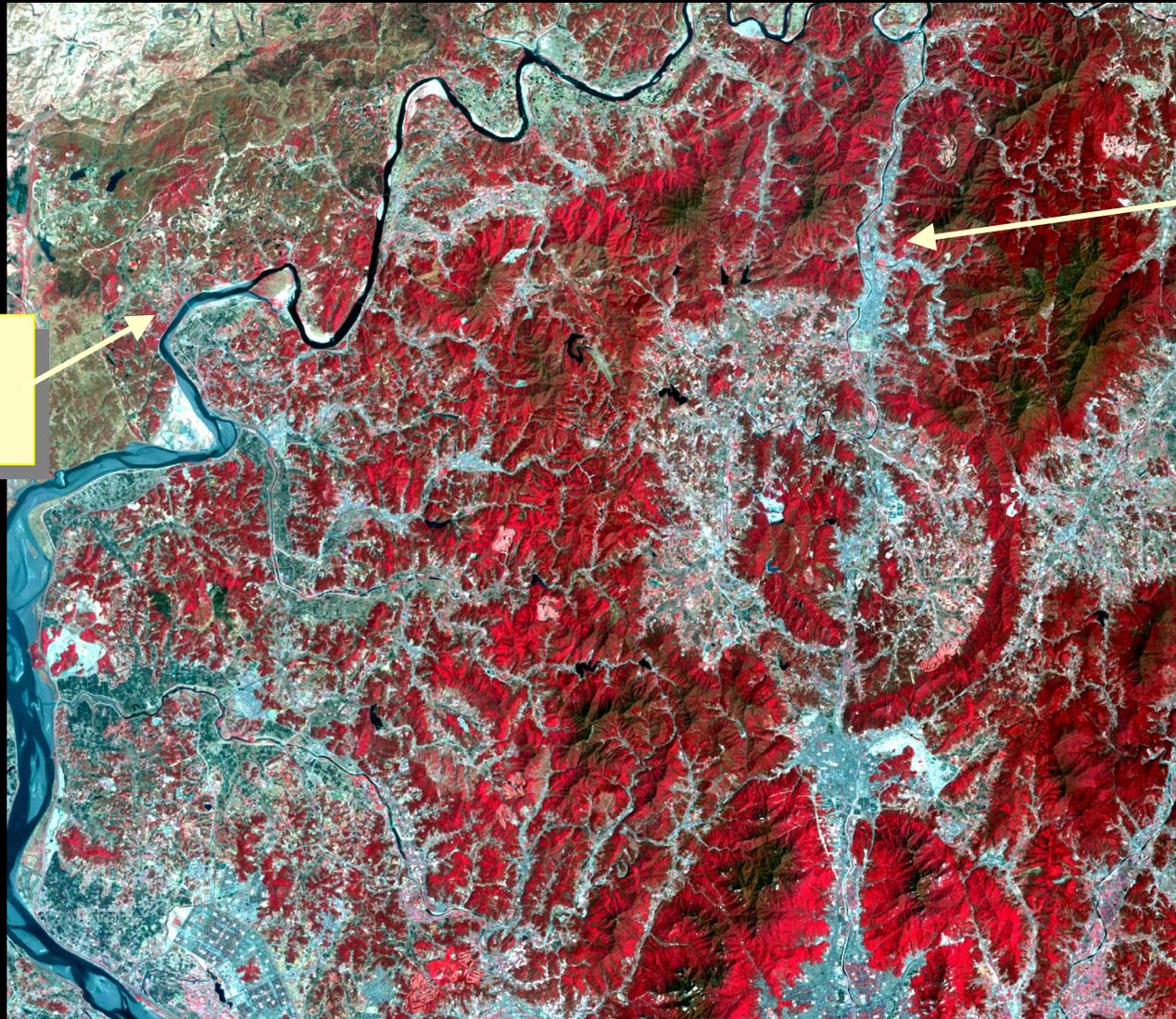
- Chemoprophylaxis

- def.- use of drugs to eliminate or prevent infection
- cost is a function of number of people requiring treatment and length of time drugs must be used
- ca. \$38.00/person/year

- Larviciding

- def.- use of “chemicals” in larval habitats of vector to kill the mosquito
- cost is a function of the size of the area requiring pesticide application and the cost per unit area.
- Ca. \$74 per hectare per application

Landsat image of study areas in South Korea
(bands 4,3,2 as red, green, blue)



Camp
Greaves

Camp Casey

Verification of habitat by larval sampling



Larval habitats: Rice Paddies



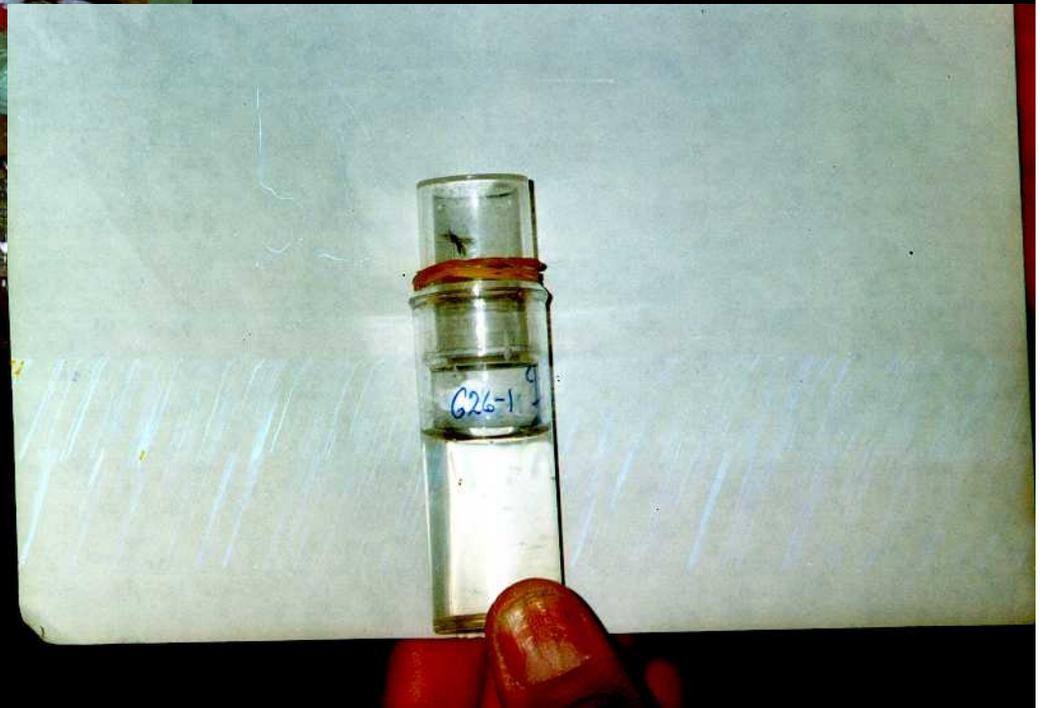
Larval habitats: Irrigation Pond



Larval habitats: Ditches

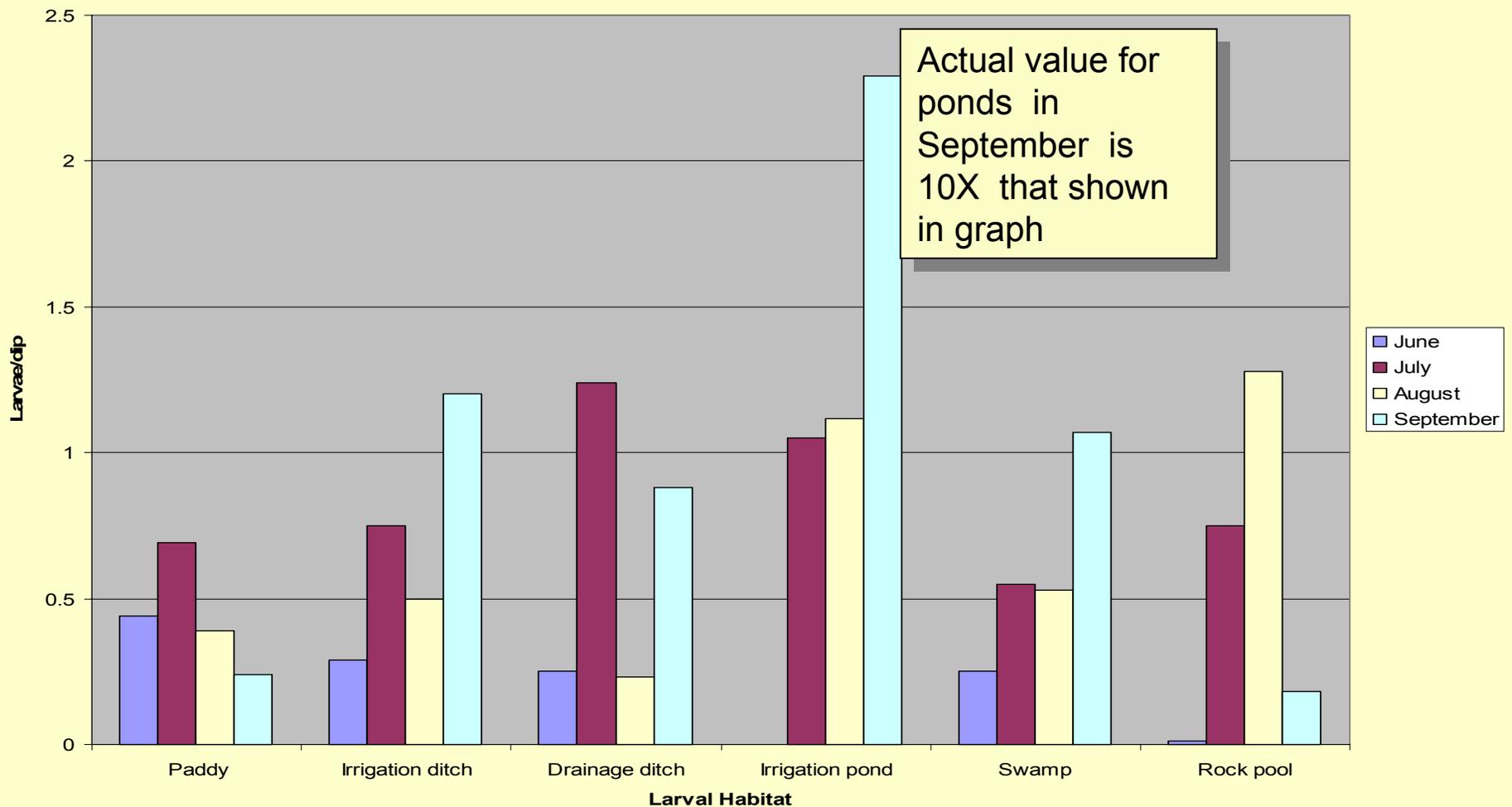


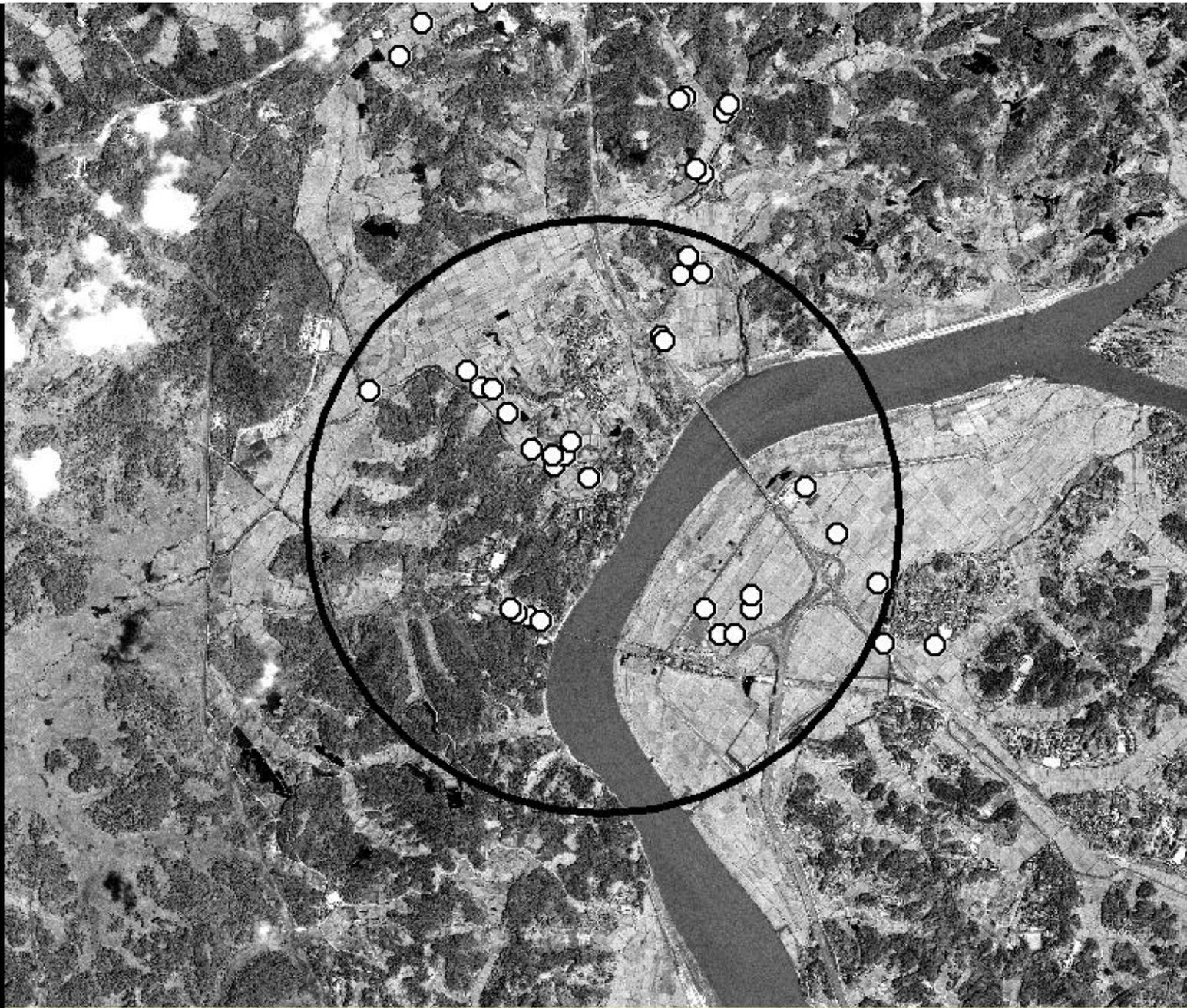
Mosquitoes were reared to adult stage to allow identification to species



Anopheline abundance in larval habitats of South Korea

Anopheles densities in larval habitats of South Korea, 2000





IKONOS image of Camp Greaves with sample sites. Circle represents a 1-km buffer zone around the perimeter of the camp

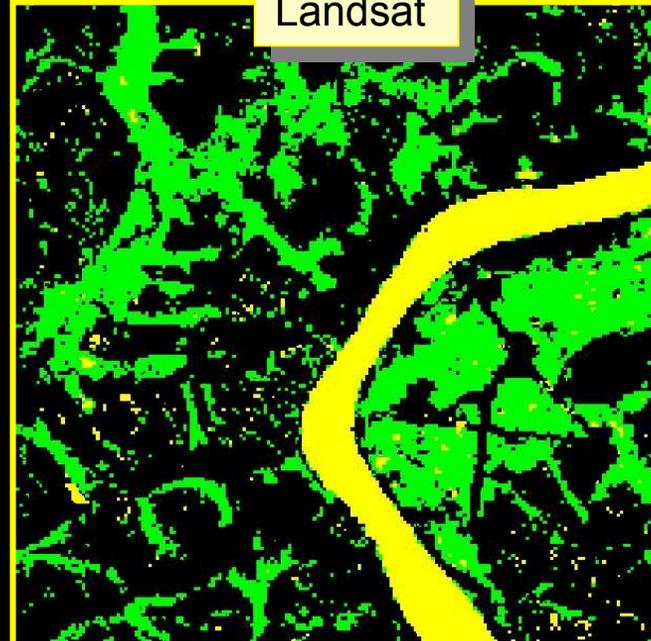
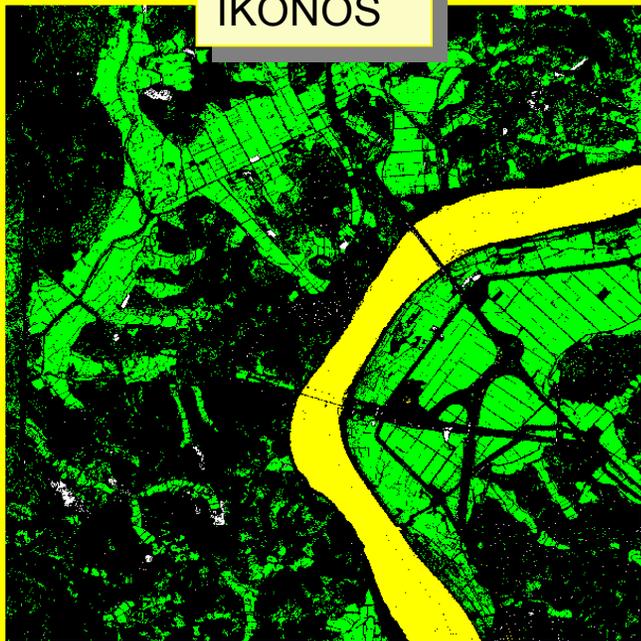
Comparison of IKONOS and Landsat images and classifications



IKONOS



Landsat



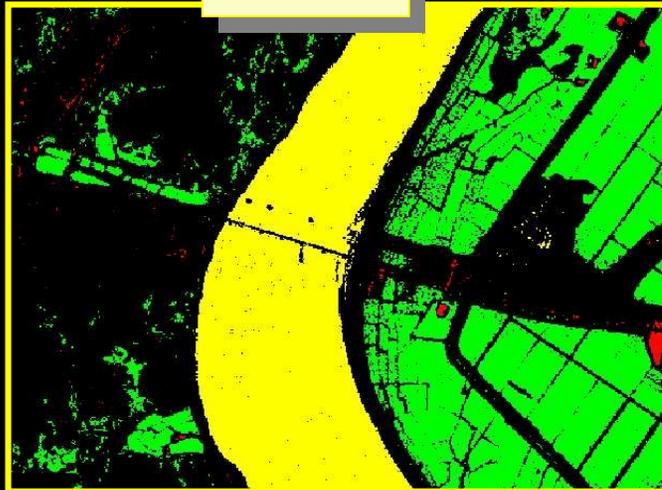
Enlarged view of IKONOS and Landsat images (false color and classified) showing vector habitat and non-habitat areas



IKONOS



Landsat



Classification difference: Black pixels (20.6%) were classified differently on Landsat and IKONOS

False color IKONOS



Classification difference image



Classification differences: Black pixels were classified as habitat on Landsat but as non-habitat on IKONOS

False color IKONOS



Classification difference image



Classification differences: Black pixels were classified as habitat on IKONOS but as non-habitat on Landsat

False color IKONOS



Classification difference image



Comparison of Land Cover Estimates (m²) for Camp Greaves

	<u>IKONOS</u>	<u>Landsat</u>
Rice fields	4,198,151	4,304,250
Ponds	48,709	n/a

Cost comparison of chemoprophylaxis to larviciding for control of malaria in South Korea

• Camp Greaves

- 430.4 ha of habitat
- Larvicide treatment = \$40,263.13
- Chemoprophylaxis cost for 760 persons = \$28,522.80
- Ratio of chemo/larv. = 0.70

• Camp Casey

- 122.5 ha of habitat
- Larvicide treatment = \$11,450.37
- Chemoprophylaxis cost for 8000 people = \$330,264.00
- Ratio of chemo/larv. = 28.8

Conclusions

- IKONOS was useful in verifying the accuracy of a Landsat classification of mosquito larval habitats.
- Ponds (only mapped on IKONOS) may be important contributors to vector populations due to high larval densities late in the growing season.
- If larviciding is done, IKONOS imagery would be very useful for locating small habitats, such as ponds and ditches.