E72-10044
CR-128124

"Made available under NASA sponsorship in the interest of early and wide dissemination of Earth Resources Survey Program information and without liability for any use made thereof."

NASA test site 151, in particular the Block Island Sound area from the tip of Long Island to Martha's Vineyard, is the subject of this discussion. Underflight and ERTS imagery were analyzed in order to determine the hydrologic features of the water mass, including current patterns, particulant in suspension, and the contacts between different water masses, as well as coastal marsh characteristics.

The ERTS imagery exposed on 28, 29, and 30 July was received from the Goddard Space Flight Center in both positive and negative form. The spectral bands included the 500-600 nm, 600-700nm, 700-800 nm, and 800-1100 nm regions. Unfortunately, the data for 29 and 30 July was not useful because of the large extent of cloud cover over the New York area. Figure 1 shows the general region covered by the frame of ERTS data which has been analyzed using a Spectral Data Model 64 multispectral projector/viewer.

Quick-look analysis of the NASA second generation negatives indicated that:

-- The green spectral band lacked contrast, owing perhaps to the presence of some haze; it was also overexposed.

-- Red spectral band was of acceptable contrast, although somewhat overexposed.

-- The infrared bands were overexposed for the land areas, but the exposure was good for the water. The land areas fell almost completely on the shoulder of the H&D curve, while the water was along the upper toe portion. Almost no areas of interest fell along the straight line region of the curve.

N72-31335
(E72-10044) A STUDY OF THE ESTUARINE AND COASTAL OCEANOGRAPHY OF BLOCK ISLAND SOUND AND ADJACENT NEW YORK COASTAL WATERS E. Yost (Long Island Univ.) 29 Sep. 1972 4 p CSCL 08H G3/13 Unclas 00044

Reproduced by NATIONAL TECHNICAL INFORMATION SERVICE U S Department of Commerce Springfield VA 22151

Contract NAS5-21799

Quick-look analysis of the NASA second generation positives indicated that:

-- The green spectral band was extremely flat, with a high D_{min} due to overexposure.
-- The red spectral band was of acceptable contrast, but too dense for projection.
-- The infrared bands lacked detail in both the water and land areas.

The characteristic curve for the NASA processed positive imagery is shown in Figure 2.

The NASA supplied positive imagery was placed into the Model 64 viewer and the spectral records projected as follows:

500-600 - Blue	700-800 - Red
600-700 - Green	800-1100 - Red

Only one of the infrared records was projected at a time with the two visible bands. The urban areas are apparent but most detail in the land is missing because of the heavy infrared exposure. Of all the records, the red has the most detail in both land and water. No obvious differences in water mass are apparent in this color composite image.

In order to enhance the water areas, the negatives supplied by NASA were used to generate a second set of positives at Long Island University. Both the exposure and processing were altered in order to enhance any small detail in the water mass by placing the low brightness regions on the straight line portion of the H&D curve. Contrast was built up by using EK 2420 duplicating film and processing in D-19. The scene brightness range for both water and land is small so that a single reproduction of

the green record is used for the enhancement of both water and land areas. A comparison of the effects of reprocessing can be made by noting the density differences in the water between NASA and LIU processing. The water mass is represented by step wedge steps #14-16. The Δ density between these steps for NASA processed infrared positives is .7, while the Δ density of the water for the reprocessed infrared positives is 1.35. The Δ density in the red region is .6 for NASA processed film and .8 for LIU. The lower D_{min} makes the water differences more obvious when projected.

Figure 3 is a composite color rendition of positive imagery reprocessed to enhance water detail. All detail in the land areas is lost, but a large gamut of colors exists in the water. Attention is called to the area south of Martha's Vineyard. High reflectance in the red spectral region could be the presence of the plankton which invade the northern waters during the summer months.

The composite shown in Figure 3 shows bleeding of the infrared record along the shoreline. This is due primarily to the heavy exposure given to the positive in order to place the areas of the water on the straight line of the H&D curve.

The NASA negatives were also reprocessed in order to enhance the land areas. The infrared bands required making an interpositive, an internegative, and finally the projection positive. This procedure was done in order to build up the contrast without losing too much land detail. It was not possible to obtain sufficient contrast using a single step. The Δ density of the land improved from .1 (NASA processed) to .7 (LIU reprocessed) in the infrared regions. The red contrast was also improved and the minimum density of all records was decreased considerably for projection. The characteristic curves for the land reprocessed positives

is shown in Figure 4 .

A color composite of this set of positives is shown in Figure 5 . Notice that the water area lacks any detail, but the land regions show considerable color differences.

These photographs indicate that it is necessary to expose and process the multispectral imagery for the scene brightness range under consideration. Unfortunately, some of the reprocessed film is grainy; this is a natural consequence of trying to develop the film to a sufficiently high contrast in order to get good projected color.