HAWK ISLAND

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PREFACE

For the past two years I have lived in a small town named Delanco in New Jersey. Since moving to Delanco I have heard numerous stories about a place called Hawk Island. While the stories have been entertaining, they were not exactly based on fact. I began to research this mysterious place called Hawk Island to try to find factual information concerning its past, present and future use. This paper represents the formal product of that research.

Delanco is a small riverfront community (2.2 square miles) in western Burlington County. It is nestled between the Delaware River to the west, the Rancocas Creek to the south, Willingboro Township to the east, and both Edgewater Park Township and the City of Beverly to the north. Delanco Township is characterized as a predominantly single-family residential community. As of 1990, the Delaware Valley Regional Planning Commission estimated Delanco's population at 3,316 persons.

Hawk Island, which is actually now a peninsula, lies in the southwestern corner of Delanco Township at the confluence of the Delaware River and the Rancocas Creek (Figure I). A map dated 1887 (Cook, 1887) shows Hawk Island as an island more than 100 years ago. From calculations of the Navigations Bureau it appears that the original island consisted of approximately 30 acres. The peninsula was created from fill as a result of the dredging of the channel in the Delaware River by the United States Army Corps of Engineers (the Corps). As it stands today, Hawk Island is approximately 118 acres, nearly four times its original size.

Another map from 1936 (Sleeper, 1936) shows the original owners of Hawk Island to be R.F. Wilmerton and Richard Fenimore (Figure II). These men were two of the earliest land owners in the town known then as Delaranco (a combination of the words Delaware and

Rancocas). Somewhere along the way, Hawk Island was subdivided into five lots (numbered 1 through 5) and sold to private owners. The Burlington County tax list (Tax List, 1927) recorded in 1927 (before the dredge and fill operation was undertaken) shows the lot sizes and owners as follows:

Lot #1- 15.0 acres, Charles H. Zeigler
Lot #2- 19.5 acres, Charles Macalester
Lot #3- 22.5 acres, Warner Company of Philadelphia
Lot #4- 6.0 acres, John B. DeNight
Lot #5- 17.5 acres, Abraham Dreifus

Total= 80.5 acres

However, the Navigations Bureau Office Engineer, Fred C. Freeman, stated in a 1953 memo (Freeman, 1953) that according to their original map of Hawk Island the acreages are as follows:

Lot #1- 15.0 acres
Lot #2- 2.5 acres
Lot #3- 10.0 acres
Lot #4- 1.0 acres
Lot #5- 1.5 acres

Total = 30.0 acres

Sometime during the 1930's the Corps began a project to dredge the channel of the Delaware River. Hawk Island was found as a suitable site for the dumping of the spoils that were dredged from the channel maintenance project. The Corps basically built a sediment wall on the Delaware River side of Hawk Island and back-filled this area with the dredge spoils. The maintenance dredging of the Delaware River channel takes place every three to seven years upon necessity. Over the course of the fifty-five years of dredging and filling operations, the Corps has

completely altered the appearance of Hawk Island. Most dramatically, they have filled the waterway between the Island and the mainland of Delanco creating the peninsula. The dredge spoil deposition has also raised the elevation of the Island dramatically to twenty-five feet above mean low water (Piel, 1958).

Currently, 10 different parties claim ownership to lots on Hawk Island. Their lots, acreages and names are as follows (Tax List, 1994):

Lot #1-	15.00 acres,	William Mitchell and Robert Landis
Lot #2-	19.45 acres,	State of New Jersey
Lot #3-	22.50 acres,	William Reed and William Cooper II
Lot #4-	11.20 acres,	John B. DeNight, Louis Steel, Morgan E. Thomas, Mrs. Colaneri
Lot #5-	15.25 acres,	Abraham Dreifus c/o Lee A. Cohen
Lot #5.01-	0.12 acres,	Alma T. Berger
Lot #5.03-	0.62 acres,	Lenart Investment Corporation
Lot #5.02-	2.07 acres,	Lenart Investment Corporation
Lot #6-	0.09 acres,	Robert N. and Joyce Harding
Lot #7-	0.09 acres,	Delanco Township
Lot #8-	0.09 acres,	Betty Kirsch
Lot #9-	9.30 acres,	State of New Jersey
Lot #10-	22.80 acres,	State of New Jersey
Total =	118.58 acres	

Most if not all of the five original owners that claimed property on Hawk Island are no longer living. Therefore many of the properties have either been sold or more likely passed down to the heirs of the original owners. As can be seen from the charts, Hawk Island has not only grown in acreage in the past fifty-five years, it has also doubled in the number of entities claiming ownership.

ZONING

In the event that Hawk Island were to be developed, the Township's Master Plan would have to be consulted to determine what type and density of development would be permitted on the Island. Delanco's most recent Master Plan Update was performed in 1992. The 1992 Master Plan (Scangarello, 1992) describes Hawk Island as characterized by extensive areas of environmentally constrained lands including wetlands and flood plains. The Master Plan also suggests that consideration should be given to the preparation of a Hawk Island Development Plan. Under the Goals and Objectives section of the Master Plan it is stated that the Township would require an Environmental Impact Statement (EIS) as part of any Hawk Island Waterfront Development Plan. This EIS which would be prepared by the interested developer, should discuss how the natural environment of Hawk Island will be protected while promoting recreational and water-related land uses in the developmental plan. This section of the Master Plan also encourages cluster development at lower densities for Hawk Island (Scangarello, 1992).

Delanco Township's 1973 Master Plan established the concept of Planned Unit Development (PUD). The objective of this type of development was to build new towns or enclaves within a development using modern design techniques. The PUD is a land development concept that provides a procedure to design the layout of a development, incorporating residential, commercial and industrial uses into a particular site at the conception of the design (Scangarello, 1992).

The PUD concept established by Delanco's 1973 Master Plan provided for a high density community with a mix of land uses and included a mix of housing types. The 1973 Master Plan "permits the average gross density permitted within a PUD in Delanco to be up to thirty-six

dwelling units per acre (Scangarello, 1992). PUDs were recommended for the land on Hawk Island but to date no development in Delanco has occurred in accordance with the PUD Provisions of the Land Development Ordinance. The Planning Board was dissatisfied with PUDs because they were seen as sizable suburban developments that would diminish the small town character of Delanco. The PUD concept also raised concerns about whether these self-contained communities would diminish the importance of the town's established commercial core and place a burden on the Township's infrastructure. As a result of these concerns, the PUD Provision was eliminated from the 1990 Master Plan Update (Scangarello, 1992).

In place of the PUD Ordinance, the Master Plan recommends that the Township "provide land use compatible with the small town residential character of the existing land use in the Township." This would be limited to single-family residential with a strong encouragement for clustering the development. The zoning of Hawk Island was therefore changed on the 1990 Land Use Map to reflect this lower density land use. This land use is designated as RW-CD2 (Residential Waterfront Cluster District 2) which is limited to "single-family detached [homes] eliminating all provisions for a combination of office-commercial and industrial land uses." (1) Density proposed for the RW-CD2 District is "based upon net developable land after the subtraction of critical wetland areas. The maximum net density of one half unit per acre is allowed in the RW-CD2 District." (2)

RIPARIAN RIGHTS

Throughout the years and with the drastic changes in the topography of Hawk Island there came many questions. The main question is who actually owns the Island and to what extent? An

additional question arose with the dredge and fill operations; who owned the land that was created? Many of the owners of the lots on Hawk Island tried to claim that created land since it was directly adjacent to their upland, they felt that it was therefore their property.

A clear case of claiming ownership to filled land adjacent to upland is exhibited in Lot #4 owned by the DeNight/Steel Corporation (this Corporation consists of John B. DeNight, Louis Steel, Morgan E. Thomas, and Mrs. Colaneri). According to the 1936 (Sleeper, 1936) map of the Island, DeNight/Steel Corporation's property was a minute fraction of the 34 acres now claimed.

Riparian lands are the lands that are under the tidewater between the mean high-water line and the exterior line for bulkheads or piers (Gannon, 1955). By law, these lands belong to the State, in this case the State of New Jersey. Ever since the conception of the United States there has been question surrounding the ownership of riparian lands. The Federal and State governments each thought that title to the riparian land belonged to them. On May 22, 1953, President Eisenhower signed and approved P.L. 31, 83d Congress, Chapter 65, First Session (H.R. 4198) the "Submerged Lands Act". The purpose of this Act was to establish and confirm the State's title to lands that lie beneath navigable waters within State's boundaries and the natural resources that lie within or upon these lands and waters. Lands beneath navigable waters include all filled in, made, or reclaimed lands which were formerly flowed by the tide. The land created on Hawk Island by the dredge and fill operations of the Corps is therefore included under this definition provided in the Submerged Lands Act (Gannon, 1955).

Riparian rights or ownership of the riparian land directly adjacent to a parcel of property may be acquired from the State by grant, or rented by lease, easement, or license (Gannon, 1955). Several owners of upland on Hawk Island applied for riparian rights to land adjoining their

property. Applications to acquire riparian rights were filed with the Navigations Bureau in 1955. On February 23, 1955 an application was made by Geraldine B. Diehl. The application was made for filled-in lands that joined her property on the mainland of Delanco to a made section of land on Hawk Island which was formerly flowed by the tide. No action was ever taken on this application (Gannon, 1955).

Jose de Pedroso, owner of Lot #2 on Hawk Island filed for riparian rights on April 25, 1955. No riparian grants were ever made from this application (Gannon, 1955).

In May of 1955 a Mr. Clifford Richmond and Mr. R.G. Smith visited the Navigations Bureau office and advised that they were endeavoring to acquire Hawk Island and the made lands with the necessary riparian rights for the purpose of a business venture. Mr. Richmond and Mr. Smith told the Navigations Bureau that they were obtaining options from the various purported owners of upland on Hawk Island. Subsequently, on May 29, 1955, R. G. Smith filed an application to acquire the riparian rights of six people- Zeigler (Lot #1), de Pedroso (Lot #2), Reed (Lot #3), John B. DeNight (Lot #4), the Estate of Abraham Dreifus (Lot #5), and G.B. Diehl (owner of property on the mainland of Delanco contiguous to made land on Hawk Island) (Gannon, 1958).

The application made by Mr. R.G. Smith was discussed at a meeting of the Planning and Development Council on July 11, 1955. At this meeting, the Council approved the recommendation of the Navigation Bureau which called for an appraisal of an area to be used as a guide in the establishment of prices for riparian rights for the land that fronts on the Delaware River. A letter was received from Mr. W. Chalmers from Manor Realty who was acquiring lands for the National Gypsum Company who eventually located upstream of Hawk Island on the banks

of the Delaware River. This letter outlined in detail the prices paid by Manor Realty Company for upland alongshore of the Delaware River. This land was to be used as a comparable sale to set prices for the land created on Hawk Island. The prices quoted in the letter ran from $1,900.00 to $2,800.00 per acre. Eventually a price was made to Mr. R.G. Smith of $3,000.00 per acre for the filled-in lands; $25.00 per foot of frontage on the Delaware River and $12.50 per foot frontage on the Rancocas Creek. The price was reviewed by Mr. R.G. Smith, who obviously was not pleased with these prices and referred to the decision of the Council as "dreamworld action". Needless to say, nothing ever materialized on the application of Mr. R.G. Smith (Gannon, 1958).

Lee A. Cohen, on behalf of the Abraham Dreifus Estate, (Lot #5) filed for a riparian grant on October 31, 1955. Another meeting of the Navigations Bureau was called to decide how to best handle the situation. At a meeting on January 9, 1956 the Planning and Development Council voted to issue a riparian grant at $12.50 per foot since the land in question boardered the less desirable Rancocas Creek. Surveys were requested from Mr. Cohen and he was questioned as to how much frontage would be obtained. However, no action was ever taken with regards to this application (Gannon, 1958).

In 1958 one last riparian grant application was filed for lands on Hawk Island. On August 14,1958, an application was made by the DeNight/Steel Corporation (Lot #4). The Navigations Bureau requested that the application be supplemented with a certified or photostatic copy of the deed whereby DeNight claims title to the upland property. The request for proof of ownership was never furnished by the DeNight/Steel Corporation and therefore nothing ever materialized on this application (Gannon, 1955).

HISTORY OF LOT #2

One of the parcels of land on Hawk Island that is rich with history is Lot #2. This parcel of Hawk Island was purchased by Mr. Charles Macalester in the 1800's. Charles Macalester was born in 1798 to a very successful Scottish merchant trader. His father was a successful businessman and some of his other accomplishments included: President of the Insurance Company of the State of Pennsylvania, Director of the Bank of North America, Founder of the Mariners Church of Philadelphia, Founder of the Marine Bible Society and Vice President of the St. Andrews Society (Anonymous, c. 1994).

Charles received an excellent education and proceeded to follow in his father's footsteps as he entered the world of finance. He was appointed as Government Director of the Second Bank of the United States in 1834, 1835, and 1837. Charles followed his Father's example and also became quite the philanthropist. Among Charles' accomplishments were: Founder of the Philadelphia Presbyterian Hospital, Founder of the Macalester Presbyterian Church, he also established the Macalester College in Minnesota and was President of the St. Andrews Society from 1864 until his death in 1873 (Anonymous, c. 1994).

During his career, Charles Macalester's financial advice was sought out by eight American Presidents from Andrew Jackson to Ulysses S. Grant. Macalester was a man of great character and integrity and was offered many Officer and Cabinet posts in government but preferred to remain independent (Anonymous, c. 1994).

When Macalester retired from the world of finance he became interested in real estate development. He regularly visited a friend, William Biddle, who had an estate along the Delaware River north of Philadelphia, the name of Biddle's estate was Andalusia. Along his travels up and

down the river, Macalester would stop at a tavern, Risdon's Tavern, for refreshment. In 1850, Macalester bought Risdon's Tavern and the surrounding acreage and changed the area's name from Poquessing to Torris dale, after his ancestor's country estate in Scotland. Charles Macalester plotted out the acreage and built a beautiful summer mansion along the river, he called the mansion Glengarry. Macalester sold the tavern to a brother-in-law who enlarged it and then eventually demolished it to build a grand Hotel to accommodate passing travelers. Eventually, Torresdale village became a very fashionable Victorian resort. The view East from Glengarry across the Delaware River is of Delanco, New Jersey including Hawk Island. Charles Macalester bought Lot #2 on Hawk Island from R.F. Wilmerton and William Newton, supposedly because of his love of the view (Anonymous, c. 1994).

Charles Macalester had a daughter named Lily who married a Belgian Diplomat and together they lived at Glengarry. Lily continued the tradition of philanthropy by raising money to refurbish Independence Hall in Philadelphia. Lily had a daughter, Camille Berghmans who married a Spanish Marquis, Jose de Pedroso on the grounds of Glengarry and then moved to Spain. Lily Macalester died at Glengarry in 1891. In 1893 the mansion was purchased by Robert and Caroline Foerderer, concluding it's tradition of being kept in the Macalester family. Today the beautifully restored summer home of the Macalesters is know as the Glen Foerd Mansion and is open for public tours (Anonymous, c. 1994).

Camille and Jose de Pedroso, the Marquis de San Carlos de Pedroso had a son named Jose Luis de Pedroso. During his earlier life in Spain, de Pedroso built racing cars and raced them. He was an Engineer and held engineering patents that he eventually sold to several countries. De Pedroso also taught locally at the Engineering School at Villanova University in

Pennsylvania. Jose Luis de Pedroso also inherited an interest in Lot #2 on Hawk Island through his Mother's family which can be traced back to his Great Grandfather, Charles Macalester (de Pedroso, 1994).

In 1962 Jose Luis de Pedroso signed a codicil to his will that donated his interest in Hawk Island to the Philadelphia Conservationists, Incorporated, a Pennsylvania non-profit Corporation. Upon his passing in 1963, this codicil was executed giving title to Lot #2 on Hawk Island to the Philadelphia Conservationists, Inc. The Philadelphia Conservationists in turn entered into a contract with the State of New Jersey, Department of Conservation and Economic Development for the sale of the property on Hawk Island for a total sales price of two thousand six hundred twenty-five dollars (de Pedroso, 1963).

THE DELAWARE ESTUARY

The condition, past and present of the Delaware Estuary has an important correlation with Hawk Island. The dredge spoils that have been and continue to be deposited on Hawk Island are the river bottom of the Delaware Estuary. To begin to understand what may be contained in these spoils, it is necessary to look at the history of the Delaware Estuary.

Beginning in Hancock, New York, the Delaware River travels 330 miles south to reach the Delaware Bay. The scenic Delaware River plays host to a number of recreational activities such as boating, fishing and even swimming in certain areas. The Delaware also plays a vital role by providing a drinking water supply to 17 million people in the Delaware Valley region. The Delaware River, one of the smallest major rivers in the United States, also serves as the largest freshwater port in the world. The conflict of uses of the Delaware River is illustrated further by

the fact that the drinking water supply for the entire Delaware Valley region also receives treated wastes from 1,450 municipal sewage systems and industrial sites (Page, 1993).

The Delaware Estuary is the 85 mile long stretch of the Delaware River which runs from the head of tide at Trenton, New Jersey, past the Philadelphia, Pennsylvania; Camden, New Jersey; and Wilmington, Delaware metropolitan areas to the designated upstream boundary of the Delaware Bay. In spite of tremendous human population and industrial activity, the 667,690 acre Delaware Estuary supports a remarkable abundance and variety of fish and wildlife resources. The United States Fish and Wildlife Service estimates that approximately 784,000 acres of wetlands and deepwater habitats are associated with this Estuary. These wetlands not only cleanse the waters of the Delaware but also serve as spawning grounds and nursery areas for fish, and other estuarine organisms (Day, 1992). As with the Delaware River, a conflict exists with the Delaware Estuary which pits man against nature. The Delaware Estuary is the sight of the second-largest oil refining and petrochemical center in the nation. Every spring, the Delaware Estuary also plays host to the second-largest concentration of migratory shorebirds in the Western Hemisphere (Page, 1993).

However, the Delaware Estuary did not always thrive environmentally as it does today. Over two centuries ago water pollution of the Delaware Estuary was observed and recorded. The pollution of the Estuary progressively worsened until after the industrially productive years of World War II. Only 100 years ago in 1900, the length of the Delaware Estuary was a thriving industrial region of 2 million people. The increase in population in the region naturally increased the water usage and discharge of wastewater into the Delaware Estuary (Page, 1993). Businesses which are known for their heavy pollution such as ship building, oil refining, mills,

slaughterhouses and many other factories naturally grew up around the river. The heavy pollution of the Delaware Estuary, which was used as a drinking water source in the city of Philadelphia, brought with it the rampant spread of water-borne diseases. For example, in 1864 the annual death rate from typhoid in Philadelphia was over 125 deaths per 100,000 population (Albert, 1988). The prevalence of deadly water-borne diseases such as typhoid demanded that something be done to relieve this crisis.

Although the technology to treat sewage was known, most communities chose instead to build more and more sewers to funnel discharges into the river downstream from their drinking water intakes. As a result of this non-scientific solution the major cities on the Delaware River obtained cleaner water supplies and deaths from typhoid dropped by 90 percent over the next forty years. Trenton, New Jersey, the northernmost major city on the banks of the estuary was the first to utilize sewage treatment as a means of protecting the water supply. Primary settling of sewage was practiced in Trenton as early as 1927. This technology mainly involved a screening of the sewage and a settling phase for the solids. Philadelphia, Camden and Wilmington did not begin primary treatment of sewage until 20 years later in the 1950's (Page, 1993).

This widespread pollution of the Delaware Estuary was recorded in a study by the U.S. Fish and Wildlife Service in 1940. The study declared the entire 85 mile river estuary, from Trenton, New Jersey to Wilmington, Delaware to be "substantially" polluted and proclaimed a zone of "gross" pollution in the area of Camden, New Jersey and Philadelphia, Pennsylvania (Page, 1993). At one point, the pollution of the Delaware Estuary was so overwhelming that a section of the river was void of oxygen and therefore incapable of supporting life. The main indicator of this pollution was the biological life which resided in the Estuary in the 1940's. The

indicator organism was a fish named the shad which had been living in the Estuary for years and had become a main staple of the area fisherman's catch. During the 1940's the river was incredibly polluted from the wastewater of heavy industry and untreated sewage of the surrounding population. The untreated sewage was dumped into the river and bred bacteria which depleted the oxygen in the Estuary. The shad, which swam upstream to spawn, either suffocated or turned back down the River. The depletion of shad in the Delaware Estuary provided a telling illustration of the quality of the water in the Estuary in the 1940's (Page, 1993).

For the last two centuries the government has recognized the problems caused by the pollution of the Delaware and has taken steps to alleviate the degradation. In the years from 1800-1910, municipal government responded to the unsafe water supplies (public health concerns) by constructing municipal water systems with river intakes; constructing some sewer lines; constructing water filtration plants; developing alternative water supplies; and constructing sanitary sewer systems. From 1936-1960 the actual pollution of the Delaware Estuary was addressed beginning with the decision to create the Interstate Commission on the Delaware River Basin (INCODEL) , an advisory commission formed by Delaware, New Jersey, New York and Pennsylvania. The clean up of the pollution in the Delaware River was the main focus of INCODEL, which established a basin-wide clean up program. In the 1939-1945 time frame INCODEL adopted the first set of interstate water quality standards. The water quality in the Delaware Estuary was improved as a result of the INCODEL program which built new sewage treatment plants throughout the Delaware River Basin (Albert, 1988).

In 1956 the Corps initiated a comprehensive river basin planning effort. As an outgrowth of this activity, the Delaware Estuary Comprehensive Study (DECS) was launched in the early

1960's. DECS studied water pollution control and developed one of the first water quality models for the Delaware Estuary. In 1962, the Corps also created the Delaware River Basin Commission (DRBC) which is an interstate, federal water resources agency with five members: the four states of the Delaware River basin and the federal government. The DRBC worked in conjunction with the DECS using their water quality model of the Delaware Estuary. In 1967 the DRBC adopted higher water quality standards with the help of the DECS model (Albert, 1988).

Around this same time the public concern regarding water pollution on a national level was increased. In 1972, the Federal Water Pollution Control Act amendments were passed. The FWPCA provided added enforcement and construction funds which ensured the implementation of the DRBC state and federal water pollution control efforts. As a result of the FWPCA , desperately needed new municipal and industrial wastewater treatment facilities were built with the construction funds provided (Albert, 1988).

Pollution and its sources still exist along the Delaware River and the Delaware Estuary in the 1990's. Approximately 90 major municipal and industrial users, over 300 combined sewer outflows, major electric-generating plants (including two large nuclear power plants) discharge into the Delaware Estuary (Albert, 1988). A 1989-1990 EPA assessment said at least 34 million pounds of chemicals are released into the estuary each year (Page, 1993). However, major companies located along the Delaware may not be solely responsible for this chemical pollution as their discharges are regulated by the State government. The responsibility for the current polluted conditions in the Estuary may lie also with nonpoint source polluters. Nonpoint source pollution is diffuse contamination that cannot be attributed to one source. For example, when rain washes over a pesticide and fertilizer laden lawn or farm, or the oil stained streets and parking areas in a

town, these contaminants are picked up by the rainwater. This contaminated rainwater naturally drains into the surrounding freshwater system such as, in this case, the Delaware River. This type of pollution has caused a new problem for regulators because it is both hard to pinpoint and hard to control.

COMMERCE ON THE DELAWARE RIVER

Navigability of the Delaware River has played a crucial role in the settling and economic development of the areas in New Jersey, Pennsylvania, and Delaware that lie on the shores of the Delaware River. The river benefits the inhabitants of this area not only aesthetically but as a major source of commerce in this region. The ports of Philadelphia, Pennsylvania; Camden, New Jersey and Wilmington, Delaware support annual vessel passages averaging 44,000 passages and tonnages averaging 114 million tons per year. The Delaware River and it's ports provide substantial economic stimulus to the entire region, supporting nearly 100,000 port-related jobs (Anonymous, c. 1992). In 1992 the total tonnage of freight traffic on the Delaware River between Trenton and Philadelphia (where Hawk Island is located) was 5,648,000 tons. The major commodities transported along this stretch of the river include coal and lignite, other hydrocarbons (methane), gasoline, distillate fuel oil, gypsum, fruit and nuts, and chemicals (benzene, sulfuric acid, sodium hydroxide, paints, plastics, etc.) (Anonymous, 1992). The transport of tonnages of commodities along the Delaware River requires a 40 foot deep channel for navigation which requires periodic maintenance dredging.

DREDGING AND DREDGE SPOIL DISPOSAL

Since the initial settling of this country, navigable waterways have played a major role in both transportation and the economic growth of the United States. In order to accommodate the world's largest freshwater port, a 40 foot deep channel has been created in the Delaware River from just below Trenton, New Jersey to the Delaware Bay. Flow and tides in the Delaware River contribute to the natural accumulation of sediment and aquatic soils in the navigation channels. For this reason, once a navigation channel has been created, it must be maintained. Maintenance dredging is the removal of accumulated sediment from previously authorized navigation and access channels for the purpose of maintaining an authorized water depth and width for safe navigation. In the United States, the responsibility for dredging of the nation's waterways lies with the Corps. On the average, the Corps dredges for navigation over 300 million cubic yards of accumulated sediments each year. Approximately 80 percent of the dredged material is from maintenance of existing projects such as the Delaware River channel (Mugler, 1983).

One of three types of dredges may be employed by the Corps to undertake a project depending on the conditions surrounding the project. The hopper dredge is a specialized piece of equipment that operates off a large capacity ship. When the shoreline does not permit the deposition of dredge spoils, the hopper dredge is most commonly utilized. Because there is no place to put the slurry, the shoreline is unavailable in this case, the hopper dredge deposits the material in its hold and, when filled, the ship heads out to deep water where the dredged material is released (Goldstein, 1983). This type of dredge would not be used for a project such as Hawk Island due to the fact that there are no deep waters in the immediate proximity.

The second type of dredge that may be utilized by the Corps is the side-cast dredge. The side-cast dredge is mainly utilized in a situation where the currents of the water body being dredged are strong enough to disperse the sediments being displaced by the dredging operation. This piece of equipment picks up materials from the bottom and disperses them in a high-pressure slurry out some distance from the ship. The idea used with this type of dredging is to displace the spoil to a larger area along the bottom of the water body than from where it was already withdrawn. This equipment utilizes the strong current which is already present in the water body (Goldstein, 1983).

The third type of dredge, the pipeline dredge, is the one that is employed in the dredging of the Delaware Estuary and the deposition of spoils on Hawk Island. The pipeline dredge is employed where there is a land disposal site not far from the channel being cleared. Because there are more estuarine channels than inlet channels in this country that need to be dredged and because there is often a place to deposit the spoil, pipeline dredges are the most common types of dredges utilized by the Corps. One benefit of the pipeline dredge is that it can use a controlled manner to deploy the spoils to the adjacent land. This technique of control can be practiced to minimize the impact of dredge spoil deposition on the environment (Goldstein, 1983).

The New Jersey Administrative Code (NJAC) provides the standards for maintenance dredging of New Jersey's waterways. The regulations state that "maintenance dredging is conditionally acceptable to the authorized depth, length and width within all General Water Areas to ensure that adequate water depth is available for safe navigation." (3) Of the conditions listed in the Coastal Zone Management section of the NJAC, three are directly related to the

maintenance dredging of the Delaware River. The following standards or conditions must be met in order for dredging to be acceptable:

~"An acceptable spoil disposal site with sufficient capacity exists."

~"A pre-dredging chemical and physical analysis of the dredge spoil may be required for upland disposal sites where the Department suspects contamination of sediments."

~"The Department may require the permittee to conduct biological, physical and chemical water quality monitoring before, during and after dredging and disposal operations to ensure that water quality standards will not be exceeded." (4)

Dredged material disposal is the discharge of sediments called spoils which are removed during dredging operations. Often a land disposal site that is along the waterway is chosen to receive the dredged materials. Regarding the choice of a land disposal site for dredged materials, the NJAC defers to the Environmental Protection Agency's (EPA) standards. "EPA guidelines require that consideration be given to the need for the proposed activity, the availability of alternate sites and methods of disposal that are less damaging to the environment, and applicable water quality standards. They also require that the choice of site minimize harm to municipal water supply intakes, shellfish, fisheries, wildlife, recreation, threatened and endangered species, benthic life, wetlands and submerged vegetation, and that it be confined to the smallest practicable area." (5)

Three standards for land disposal of dredge spoils listed in the NJAC that apply to Hawk Island are:

~"Uncontaminated dredge sediment with 75 percent sand or greater are generally encouraged for beach nourishment on ocean or open bay shores."

~"The use of uncontaminated dredged material to create new wetlands or islands in any General Water Area is conditionally acceptable depending upon an evaluation of the biological value of the wetlands gained compared with the biological value of the water area lost."

~"Dredged material disposal in lakes, ponds and reservoirs is prohibited." (6)

The dredged materials that were dumped on Hawk Island were approximately 70 percent sand and 30 percent gravel (Ambler, 1994). The sand that was deposited on Hawk Island increased the size of the original island by 3 times. At this time, and without photographs of the original shores of the Island, it is hard to tell whether the beaches have been enhanced by the deposition of the spoils. However, potions of the shoreline bordering the Delaware River have cliffs of approximately thirty feet in height that were not original to the Island.

The second standard states that the use of uncontaminated dredged material to create new wetlands or islands is conditionally acceptable depending upon an evaluation of the biological value of the wetlands gained compared with the biological value of the water area lost. The only assessment of any type that was done on Hawk Island was performed in 1956. On October 18, 1956, Mr. B. Eldredge, biologist, Mr. R. Hawley, Game Management Agent of the Fish and Wildlife Service U.S. Department of the Interior, and L.G. MacNamara, New Jersey Division of Fish and Game inspected the possible dredge spoil disposal sites along the New Jersey side of the Delaware Estuary. A memo from Mr. MacNamara (MacNamara, 1956) identifies the importance

of the Delaware Estuary as a feeding and resting ground for a considerable portion of the migrating waterfowl and shore birds that each Fall and Spring frequent the Atlantic Flyway. The memo cites that the Delaware River is an important segment of the wetland habitat of the Atlantic Flyway and is of significant importance to the maintenance of a good waterfowl population in New Jersey (MacNamara, 1956). When the Hawk Island site was evaluated, with respect to dredge spoil deposition, the gentlemen decided that the damage to waterfowl would be only minimal. Their evaluation concluded that Hawk Island was an acceptable spoil area and recommended that as much spoil as possible be placed on Hawk Island (MacNamara, 1956).

In approximately 1970, two large non-tidal ponds were created on Hawk Island as a result of dredging operations. No assessment of their biological value was ever undertaken by the Corps or the NJDEP. Originally these ponds were left on the Island with the idea that they would provide future area for the deposition of dredge spoils. However, these large non-tidal ponds became naturally inhabited by organisms and wildlife over time. Despite this fact, in 1988 the Corps and NJDEP allowed one of the ponds to be filled in with dredged materials, killing all life that existed in it. Even though wetlands were created (the ponds) for wetlands that were destroyed (the area between Hawk Island and the mainland of Delanco), these remaining wetlands are being destroyed by subsequent dumping of dredge spoils. The action of filling in the large non-tidal pond also directly violates the third condition of dredged material disposal that states "dredged material disposal in lakes, ponds, and reservoirs is prohibited."

The NJAC also has policies that govern land and water's edge disposal of dredge spoils. "Dredge spoil disposal is conditionally acceptable under the following conditions: sediments are covered with appropriate clean material that is similar in texture to surrounding soils; and the

sediments will not pollute the groundwater table by seepage, degrade surface water quality, present an objectionable odor in the vicinity of the disposal area, or degrade the landscape." (7) NJAC also suggests or condones the following beneficial uses of uncontaminated dredge material:

~restoring landscape

~enhancing farm areas

~creating recreation oriented landfill sites including

beach protection and general land reclamation

~building islands

~creating marshes

~capping contaminated spoil areas

~making new wildlife habitats

The NJAC also states that the "effects associated with the transfer of the dredged materials from the dredging site to the disposal site shall be minimized to the maximum extent feasible." (8) This is the reason why disposal sites were chosen along the Delaware River; for convenience and feasibility of disposal costs.

SOILS

The Soil Survey of Burlington County was compiled in 1970 as a part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the New Jersey Agricultural Experiment Station. The soil survey map depicts the soils on Hawk Island as Made land, dredged coarse material (Ma). Hawk Island was primarily a receiving area for material from dredging operations. The coarse material or river bottom was dredged from the Delaware River.

and pumped into diked areas alongside Hawk Island. The diked areas were slowly allowed to drain and the coarse material settled, creating the made land (Markley, 1971). The two large non-tidal ponds were created by diking these settling areas when one cycle of the dredge and fill operations was nearing completion.

The soils on Hawk Island have the consistency of sand rather than gravel although there is a mixture of approximately 80 percent sand and 20 percent gravel. The made land, dredged course material consists of sand and fine soil particles which have the capability of being revegetated but are not suitable for crops. Many perennial weeds and trees such as river birch, sycamore, black locust, red maple, boxelder and willow will invade naturally and revegetate an area such as Hawk Island (Markley, 1971).

AMICO SAND AND GRAVEL COMPANY

During the thirteen years between 1958 and 1971 the State of New Jersey had an agreement (contract) with the Amico Sand and Gravel Company of Riverside, New Jersey for the removal of dredged material placed on Hawk Island. Amico Sand and Gravel Company was the source of sand and gravel for a number of concrete and asphalt plants in the Riverside/Delanco area. Amico Sand and Gravel Company paid the State of New Jersey for the removal of the sand and gravel (dredge spoils) and then processed, and later sold the material to other businesses. Amico paid five cents per cubic yard for the material in 1958 and by 1971 was paying 25 cents per cubic yard. Amico saw this dredged material as a "natural resource" and sold it to construction firms for its beneficial long term use in the construction of roads, bridges, buildings and other structures (Ambler, 1994). The dredged material that Amico Sand and Gravel Company removed

from Hawk Island was approximately 70 percent and 30 percent gravel. Over the length of their project, Amico removed approximately 2,600,000 cubic yards of material in all or 200,000 cubic yards of material annually (Ambler, 1994). That amount of material, is the equivalent of the area of a football field (100 yd x 53 yd) piled to a height of 487 yards or 1463 feet high, higher than the Empire State Building in New York City!

WETLANDS

Wetlands are "an area or areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation." (9)

According to the National Wetlands Inventory (NWI) map (Figure III), there are three major areas of wetlands delineated on Hawk Island. The first area is the large non-tidal pond which is designated as Open Water with an unknown bottom. The other large non-tidal pond that once existed on Hawk Island carried this same designation. The southern edge of Lot #1 which borders the Rancocas Creek near the tip of the Island is also designated as wetlands. This area is identified as Forested/Broad-Leaved Deciduous (shedding leaves annually). When comparing the current map of Hawk Island with original maps, this forested area seems to be part of the original upland of the Island. The third and final wetland area shown on the NWI map is the shoreline bordering the Delaware River from the mainland of Delanco to the point or tip of the Island. This area is characterized as Riverine/Tidal/Semi-permanently Flooded/Subtidal.

Wetlands play a number of critical roles in aquatic habitats and therefore merit special protection. Wetlands provide critical habitat for many important species of fish and wildlife. Wetlands also provide plant particles that serve as food for aquatic organisms in adjacent waters. Wetlands serve as a buffer area, protecting adjacent lands by absorbing peak flood waters, reducing damage to downstream property. Wetlands also improve water quality as a result of a number of natural processes that remove pollutants from water flowing through them (Anonymous, 1989). Besides providing important habitats, buffering capacity and water quality maintenance, wetlands control erosion and recharge groundwater supplies. Along with these critical roles, wetlands provide aesthetic, recreational, scientific, and educational values to the surrounding community.

Despite the fact that Hawk Island has been significantly altered by the dredge and fill operations, some vital wetland habitats still thrive on and around the Island. The largest portion of wetland habitat on Hawk Island is on the banks of the Rancocas Creek. This area serves as an ecotone or transitional zone between aquatic and terrestrial habitats. These riparian habitats support diverse wildlife communities, often in greater densities than the adjacent upland habitats. Therefore, Hawk Island is characterized as a refuge for wildlife along the Delaware River (Hafner, 1993).

Even though environmental factors were not an issue when Hawk Island was first utilized as a dredge spoil site, the disposal has caused lasting damage to the natural landscape. It is probable that the environmental issues of today, and the consequences of such actions were not even considered when utilization of these disposal sites first began in the early 1900's. However,

this indiscriminate destruction of the landscape has converted approximately forty acres of shallow water habitat to uplands that now have little value to wildlife (Hafner, 1993).

1984 TEST RESULTS

In 1984 the Corps had chemical analysis performed on the sediment in the Delaware Estuary from Trenton, New Jersey to Philadelphia, Pennsylvania. Twenty points in the Estuary were sampled and the results are provided in Attachment I. The samples were collected on four different days; August 15, September 11, September 12, and September 17 of 1984. The analyses were limited to 15 basic parameters and from this limited number of parameters it is difficult to define or characterize the dredged materials. These 15 parameters include 3 water quality parameters: pH, dissolved oxygen (DO), and total dissolved solids (TDS); 4 heavy metals: copper (Cu), lead (Pb), zinc (Zn), and mercury (Hg); other parameters include: polychlorinated biphenyls (PCBs), oil and grease, chlorides, total organic halides (TOH), ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, and total phosphorous.

A crude map accompanies the test results and shows approximately where the samples were taken (river miles are provided on Attachment I). Location #14 represents the area in the Delaware River parallel to Hawk Island (river mile 110.5). The sample from location #14 may not be representative of the material on Hawk Island for several reasons:

~The dredged material on the Island has been placed there since the 1930's over a period of 55 years when the river bottom was quite different than it was in 1984 when these samples were taken.

~The spoils that have been dumped on Hawk Island may have come from several different locations in the Delaware River, not just directly adjacent to the Island.

~The testing gives no indication of the depth at which the samples were taken.

In 1984 when this analysis was performed for the Corps, the Extraction Procedure (EP) toxicity leachate test was utilized. The Toxicity Characteristic Leaching Procedure (TCLP) replaced the EP toxicity leachate test in 1990 (55 FR 61, March 1990). The TCLP is a more aggressive leachate test than the EP toxicity test for high alkaline wastes and volatile organic compounds. A list of 119 parameters to be tested in the case of upland disposal was provided by the NJDEP (Attachment II). However, this list was never included in the regulations, it was used as a guidance document in cases where contamination was suspected. According to the Corps and NJDEP the testing performed in 1984 is sufficient and further testing especially of 119 parameters is unnecessary. However, the NJDEP has realized the deficiency of proper standards in the regulations that refer to upland disposal of dredge spoils. It is not clear what standards test results are to be compared to; ground water quality standards, drinking water standards, the standards for sludge disposal on land, etc. The NJDEP is working to develop standards that will apply to upland disposal of dredged material and hopes to have these standards out for review by the end of 1994 (Schmidt, 1994).

DISCUSSION OF 1984 DATA

pH

The pH of the samples taken range from a low value of 4.7 SU to a high value of 7.0 SU. These figures represent a neutral to slightly acidic pH in the Delaware River.

DISSOLVED OXYGEN

Dissolved oxygen, the lifeblood of the river, is needed to sustain the organisms in the river. An ample supply of dissolved oxygen ensures that the river's self-purification processes will be able to operate effectively. Oxygen uptake in the river is caused by bacterial oxidation of organic matter. Replenishing of oxygen is accomplished by photosynthesis, reaeration from the atmosphere, and dilution with well-oxygenated water.

The samples obtained from the Delaware River in 1984 show the dissolved oxygen level ranging from a high value of 6.4 mg/l to a low value of 2.0 mg/l.

The biochemical oxygen demand (BOD) test is a measure of the polluting organic matter present in a sample of water. BOD can be defined as the amount of dissolved oxygen consumed by chemical and microbiological action when a sample of water is incubated for 5 days at 20 C. An inverse relationship exists between BOD and DO. When organic matter is introduced into a river, the biodegradation of the organic matter will rapidly decrease the dissolved oxygen content and create a biochemical oxygen demand in the polluted water. If BOD analysis had been performed on the samples taken in 1984, this relationship could be proven with the data and presented graphically. This is an example of the test results from 1984 being incomplete.

TOTAL DISSOLVED SOLIDS

Total dissolved solids is a measure of the total amount of minerals dissolved in water and is , therefore, a very useful parameter in the evaluation of water quality. Water containing less than 500 mg/l is preferred for domestic use and for many industrial processes.

The sampling data presented shows an up and down fluctuation in the amount of total dissolved solids in the Delaware River. A high value of 300 mg/l was recorded at location #3 and a low value of 72 mg/l was recorded at location #5. The values for TDS are all within the optimum range of less than 500 mg/l.

TOTAL PHOSPHORUS

Phosphorus is an important and controversial component in waters. While phosphorus is an essential nutrient for both plant and animal growth, in overabundance it promotes the growth of algae. The major sources of phosphorous in natural waters are industrial pollution, fertilizer runoff, domestic wastes and decayed organic matter (Manahan, 1975).

All but one location in the 1984 sampling data shows a level of total phosphorous below the detectable limit of 0.30 mg/l.

NITROGEN

"Compounds of nitrogen, either in the dissolved state or as suspended matter, are very important in waters and play a strong role in many aquatic biological reactions. The predominant inorganic nitrogen species in water are nitrate ion, NO3-, and ammonium ion, NH4+. The

sources of nitrogen in water are varied and include decayed organic matter, domestic wastes, industrial wastes, barnyard wastes, and fertilizers." (10)

Ammonium oxidation or nitrification plays an important role in the oxygen dynamics of a river. Nitrification is microbial oxidation that involves the oxidation of ammonium to nitrite and then to nitrate. This is a two step process performed by autotrophic bacteria. "One group of organisms (Nitrosomonas is one genus) oxidizes ammonia to nitrite, and the other group (Nitrobacter) oxidizes nitrite to nitrate; the complete oxidation of ammonia to nitrate is thus carried out by members of these two groups of organisms acting in sequence." (11) The overall nitrification process is described by the formula:

$$NH4+ + 2O2 \text{ -------> } NO3- + 2H+ + H2O$$

Two points can be made from this equation. First, nitrification requires a considerable quantity of oxygen. Secondly, hydrogen ions (H+) are formed in the nitrification process causing a drop of pH in the river.

From the 1984 sampling analysis ammonia nitrogen is at its highest level, 27 mg/l at location #2 (river mile 131.0). Nitrate nitrogen, a product of the nitrification process is at its highest level, 2.0 mg/l at location #3 (river mile 129.7) and spikes again, 1.0 mg/l at location #5 (river mile 125.2). Levels of dissolved oxygen drop severely at locations #4 (river mile 126.2) and #5 (river mile 125.2) from the depletion during the nitrification process. Since these samples were all collected on the same day, this is an example of the nitrification process. Nitrite nitrogen was never found above the minimum detectable limit of 0.10 mg/l.

CHLORIDES

Chloride is one of the halide ions and is a common constituent of natural waters. "Chloride ion at moderate levels has relatively little effect upon the chemical or biological characteristics of waters. However, excessive levels of salts, many of which are chloride salts, can result in the deterioration of water quality due to excessive salinity." (12) Runoff from the street deicing chloride salts of sodium chloride and calcium chloride contribute to the chloride level of natural waters. Other sources of chloride in natural waters include irrigation run off and brine produced in oil extraction and mining. At high levels, chlorides can be toxic to freshwater aquatic organisms, therefore reducing the availability of fish for human consumption.

At most of the sampling locations chlorides were found to be below the detection limit of 5.0 mg/l. The highest concentration of chlorides obtained in the 1984 sampling was 11.o mg/l at location #12 (river mile 114.2).

OIL AND GREASE

Oil is defined as a naturally occurring combustible liquid composed of hundreds of hydrocarbons and other organic compounds; also known as petroleum. This test should show any oil and grease from boat and ship traffic or nonpoint source pollution such as roadway runoff that has contaminated the River.

The data of the oil and grease concentrations shows very inconsistent high and low levels of the constituents. The highest level of oil and grease was detected at location #2 (river mile

114.2) and had a reading of 1700 mg/l. Four locations were found to have a concentration of oil and grease below the detectable limit of 50 ppm.

HEAVY METALS

The 1984 test data was analyzed for the concentrations of four heavy metals that have been widely used in the United States in industry: copper, lead, mercury and zinc.

"Copper is a dense, ductile, malleable metal with good heat and electrical conducting properties. It is readily converted to the metallic state, and is even found in nature as the metal. It has been used by man for about 5000 years. Copper is very widely used as an electrical conductor, in alloys, in chemicals, and in many other applications." (13)

"Lead, a soft malleable metal, is readily isolated from its ores. For that reason it has been known and used by man for approximately 6000 years. Although lead is used in a very large variety of applications; by far the largest use is in storage batteries." (14) Lead also used to be an antiknock additive in gasoline and in paint pigments until it was found to be harmful.

"Mercury, a fluid metal at ordinary temperatures, finds many applications in a highly technological society. It is widely used in instruments such as thermometers and barometers. It is employed in electronic and electrical apparatus. Its compounds have been used to a large extent as slimicides and fungicides, resulting in some undesirable mercury pollution. Because of pollution and toxicological problems, use of mercury compounds has been severely restricted." (15)

"Zinc, a bluish-white metal, is widely used in alloys. The largest application of zinc is in galvanization-coating steel with zinc to prevent corrosion. Other major uses include zinc anodes in batteries, paint pigments and chemicals." (16)

Heavy metals found in freshwaters could be the result of atmospheric deposition, road runoff, industrial discharges, sludge and sewage treatment plant discharges or acidic mine effluents. The impact of heavy metals in freshwaters on the aquatic community would be a decline in fish populations due to failed reproduction. The human population could feel the impacts through increased costs of water treatment, reduced availability of fish and, in severe cases, lead poisoning or minimata disease (Manahan, 1975).

Of the four heavy metals, three metals, copper, lead, and mercury were all found to be below their respective detectable limits of 0.05 mg/l, 0.05 mg/l and 0.001 mg/l. Zinc was the only one of the heavy metals found in the 1984 test data. The most significant concentrations were found at locations #4 (3.7 mg/l) and location #20 (2.5 mg/l).

TOTAL ORGANIC HALOGEN (TOH)

The halogen group, Group VIIA on the Periodic Table of Elements, consists of fluorine, chlorine, bromine, iodine, and astatine. The two most prevalent of these elements are fluorine and chlorine. Fluorine is a very important industrial chemical used, for example, to prepare fluorocarbons, such as Freon 12 which is used as a refrigerant and as a propellant for aerosol cans. Chlorine is by far the most commercially important halogen. Chlorine is used in the production of vinyl chloride which is used in polyvinyl chloride (PVC) manufacture. Probably the

most widespread use of chlorine is as a bleaching agent in the paper and textile industries and in the treatment of municipal water supplies.

The 1984 test data shows three peaks of TOH. The highest concentration of TOH detected was at location #14 (river mile 110.5) and was 0.15 mg/l. Other concentrations include location #11 (river mile 116.0) at 0.085 mg/l and location #2 (river mile 131.0) at 0.056 mg/l. Ten locations of the twenty locations sampled showed a reading below the detectable limit of 0.010 mg/l.

PCBs

Polychlorinated biphenyls consist of biphenyl that has been chlorinated in one or more sites, resulting in as many as 209 different congeners containing from 1 to 10 chlorine atoms. The higher the number of chlorine atoms, the harder it is to degrade the compound. This high chemical stability coupled with electrical resistance and a poor tendency to combustion made PCBs very desirable in commercial industry for use in heavy-duty transformers and capacitors, as lubricants, electrical insulators, hydraulic fluids and placticizers. PCBs could be found in common household products such as plastics, flame retardants, preservatives and protectants in rubber, weatherproof coatings, waxes, varnishes, inks and various other products. The quality of stability that made PCBs so desirable and promoted their widespread use, is what also makes them so undesirable in the environment. Because of their resistance to physical and biological degradation, PCBs are now recognized as widespread and potentially harmful pollutants. Analysis of water and sediment samples for chlorinated pesticides frequently yield evidence of these compounds (Manahan, 1975).

Nine of the twenty sampling locations in the 1984 testing analysis gave readings for PCBs. The highest result, 2.6 ug/l, was detected at location #5. Two of the other notable concentrations were found at location #3 (river mile 129.7) at 1.0 ug/l and location #18 (river mile 103.7) at 1.3 ug/l. However, eleven of the locations sampled showed a reading below the detectable limit of 0.40 ug/l.

ALTERNATIVES

To environmentalists, the most obvious alternative for Hawk Island is that it be preserved in its natural state. A plan for a low impact recreational area or park with nature trails could be designed. This would be beneficial for the local population and could be utilized by the area schools to teach children about the importance of the preservation of the natural environment.

Even though Delanco is a riverfront community, there aren't many public areas to enjoy the riverbanks of either the Rancocas Creek or the Delaware River. Along the banks of the Delaware runs a strip of property which runs anywhere from 15 to 30 feet wide. Directly boardering this property is Delaware Avenue, a street that runs parallel to the Delaware River. This property that boarders the River is privately owned by the people who own the land across the street. This limits the access to the banks of the Delaware River for recreators. A passive recreation area on Hawk Island would benefit the local population by providing access to the desirable riverfront area.

As of 1988, Hawk Island was officially closed to the public, therefore only lawbreaking citizens can enjoy it's natural beauty. It became obvious at the Hawk Island Clean-up Day held in April of this year that Hawk Island is utilized by beer-drinkers as a hang-out. These people

obviously have no regard for the Island as was apparent by the amount of trash that was cleaned up on the Island that day. Township officials must figure out a way to police the Island to prevent unwelcome, irresponsible, trash-bearing guests from ruining the natural landscape and habitats.

The Green Acres Program is a land preservation program administered by the New Jersey DEP. The Green Acres Program seeks to permanently preserve land for the public use and enjoyment. State funds are available for the acquisition of open space lands and the development of outdoor recreation facilities on these lands. The Burlington County Land Use Office has developed a program to protect the Rancocas Greenways. The Rancocas Greenway is the open space or land directly adjacent to the Rancocas Creek which originates in the heart of the Pine Barrens and flows westward to the Delaware River (where it passes Hawk Island). The objective of the Rancocas Greenway project (Anonymous, 1993) is to preserve open space in order to:

~Protect the environment through the creation of adequately sized vegetation buffer strips.

~Preserve the remaining aesthetic, cultural and historic aspects of the waterway.

~Permit public access to the creek for passive recreation uses at appropriate locations.

~Provide specific areas dedicated to suitable active land and water-related recreation uses.

~Maintain flood plains to minimize periodic flood damage.

The Burlington County Land Use Office has been granted 3 million dollars under the Green Acres Program. This funding was to be used in the acquisition of two large farms located along the Rancocas Creek in Delanco Township. The Pennington Farm which comprises approximately 171 acres along the Rancocas Greenway is not up-for sale and currently the owner

is not interested in any type of government program. This same feeling was shared by Mr. Russ, the owner of an 80 acre farm located adjacent to the Pennington Farm. Unfortunately, Mr. Russ has passed away this year and Burlington County is seeking the opportunity to use the monies provided by the State to purchase the Russ Farm from his heirs.

The monies appropriated to Burlington County by the NJDEP under Green Acres must be expended within a certain time frame and therefore, the County Land Use Office has come up with an alternate plan. In the event that the Pennington and Russ farms cannot be acquired, a list identifying desirable parcels of land along the Rancocas Greenway has been compiled by the Land Use Office. On this "Preliminary List of Properties" prepared in 1993, Hawk Island ranks 4th out of 9 parcels. Again, the question of ownership of the properties on Hawk Island must be addressed before acquisitions can be sought by Burlington County or any other entity. If Burlington County were to purchase the properties on Hawk Island, the County would have total control over whether the Island would be maintained as open space or as a passive recreation area. Although funding is provided by the NJDEP through the Green Acres Program, 25 percent of the monies used to purchase the properties would be provided through a grant and 75 percent of the monies would be provided through a low interest loan to Burlington County.

Concerns of the fate of Hawk Island should the County purchase it through the Green Acres Program have been raised by both the Mayor of Delanco and the town's people. Mayor Bob Bellan is mainly concerned about the policing, fire protection and general upkeep of Hawk Island (these services are currently provided by the Township of Delanco). Residents of Delanco are concerned about the utilization of Hawk Island as open space or a passive recreation area-what would these options mean to the local population? One thing is certain, if the Island is

purchased by Burlington County through the Green Acres Program the deeds would be restricted and development will no longer be an option.

Under current zoning laws, the development of Hawk Island is also an option. This would most likely required clear title to be established. It would also require quite a bit of money since no roads, sewers or utilities exist currently on the Island. It is however seen as a "prime" piece of real estate due to its riverfront location.

Another alternative for Hawk Island due to it's complex and almost undeterminable ownership claims is for the area to be determined to be blighted. The connotation of the term blighted brings to mind a run-down area, not an area of natural beauty such as Hawk Island. But according to the New Jersey Statutes Annotated a blighted area is an area that has experienced a lack of utilization caused by the condition of the title by diverse ownership of the property which results in a stagnant and unproductive condition of potentially useful land which is valuable for contributing to and serving the public health, safety and welfare.

Hawk Island has been a productive piece of property for the Corps and the NJDEP as a dredge spoil site. But to the citizens of Delanco it has been stagnant and could be much more productive if it were accessible and utilized in a desirable manner. For the area to be determined blighted would mean a court battle with both the purported landowners and the State of New Jersey. If the Township of Delanco were successful in proving the case, the Township would have the option to purchase the land at a fair market value.

Sometime in 1995, the Corps is scheduled to perform maintenance dredging of the Delaware River channel. When this project is undertaken, Hawk Island will be a potential location for the dredge spoils. In the 1950's the capacity for dredge spoils on the Island was set at

25 feet. In order to accommodate this standard, Amico Sand and Gravel Company removed dredged material from the Island over a period of 12 years. In 1988, to maximize the capacity of the Island as a disposal site, one of the large non-tidal ponds was filled in with spoils. Aside from mounding the dredge spoils in a dangerous and unsightly manner, or filling in the only remaining non-tidal pond on the Island, the Corps is running out of options for the continued utilization of Hawk Island. It is obvious from aerial photos taken by the DVRPC that the entire Island has been altered by the deposition of dredge spoils not just the parcels that the State claims ownership to. According to the NJAC the Corps is also to be held responsible for revegetation of areas devastated by the dumping, this has not been enforced over the years.

Dredge spoils can be used in a number of beneficial ways upon the scientific determination that they contain no toxins. Dredge spoils can be utilized by a sand and gravel company for construction of asphalt roads, or as an ingredient in concrete for bridges and buildings. In North Carolina, dredge spoils have been used to create islands to support the migratory bird population. If planned and managed properly, this method can enhance habitats, not destroy them. In the continental United States there are approximately 2,000 dredge spoil islands that have been created by the dredging process. Many of these islands provide habitats for many ground-nesting sea birds such as terns, gulls, skimmers, and arboreal-nesting wading birds including herons, egrets, and ibis (Goldstein, 1983).

The NJAC encourages the use of uncontaminated dredge spoils for such purposes as "restoring landscape, general land reclamation, and beach protection or beach nourishment." Beach nourishment is the placement of sandy dredge spoil on sandy beaches that have been severely eroded. Over the past few years, the New Jersey coastline has been battered by several