A Sustainable Chesapeake

BETTER MODELS FOR CONSERVATION

Edited by David G. Burke and Joel E. Dunn

THE CONSERVATION FUND

The case study you have downloaded is highlighted below. Other case studies from this Chapter of *A Sustainable Chesapeake: Better Models for Conservation* can be individually downloaded. The editors encourage readers to explore the entire Chapter to understand the context and sustainability principles involved with this and other featured case studies. The full publication contains 6 Chapters in total: Climate Change Solutions, Stream Restoration, Green Infrastructure, Incentive Driven Conservation, Watershed Protection and Stewardship.

CHAPTER 3 GREEN INFRASTRUCTURE

Green Infrastructure and Organic Farming

Managing a Sustainable Enterprise on Chino Farms in Queen Anne's County, Maryland

A farm owner with extensive land holdings on Maryland's Eastern Shore has pioneered new approaches to land conservation, grasslands management and green infrastructure restoration, which have created a vision and body of knowledge for others to follow.

CASE STUDY SUMMARY

Chino Farms offers a private landowner conservation model of regional and national significance. Dr. Henry Sears, with the help of his able farm manager Evan Miles and a team of researchers, volunteers and government specialists, has created a remarkable 5,200 acre matrix of native grasslands and forest and wildlife habitats along side of a working organic farm operation. Chino farms produces corn, soybeans, hay, wheat, organic peas and corn.

Dr. Sears is inherently curious about the ecological processes at work on the farm and the relationships between plant communities and wildlife. He is also eager to demonstrate how good conservation practices coupled with market driven, innovative economic incentives can help farm owners incorporate green infrastructure concepts, manage their lands sustainably and prevent loss of farmland to development. A prevailing philosophy Sears supports recognizes the need for the standard corn, soybean and wheat rotation operations prevalent on the Eastern Shore to gradually evolve. He foresees opportunities for more profitable niche markets; locally generated renewable energy sources from the sale of agricultural and forest products; and collaborative efforts among farm owners to develop viable alternative markets.

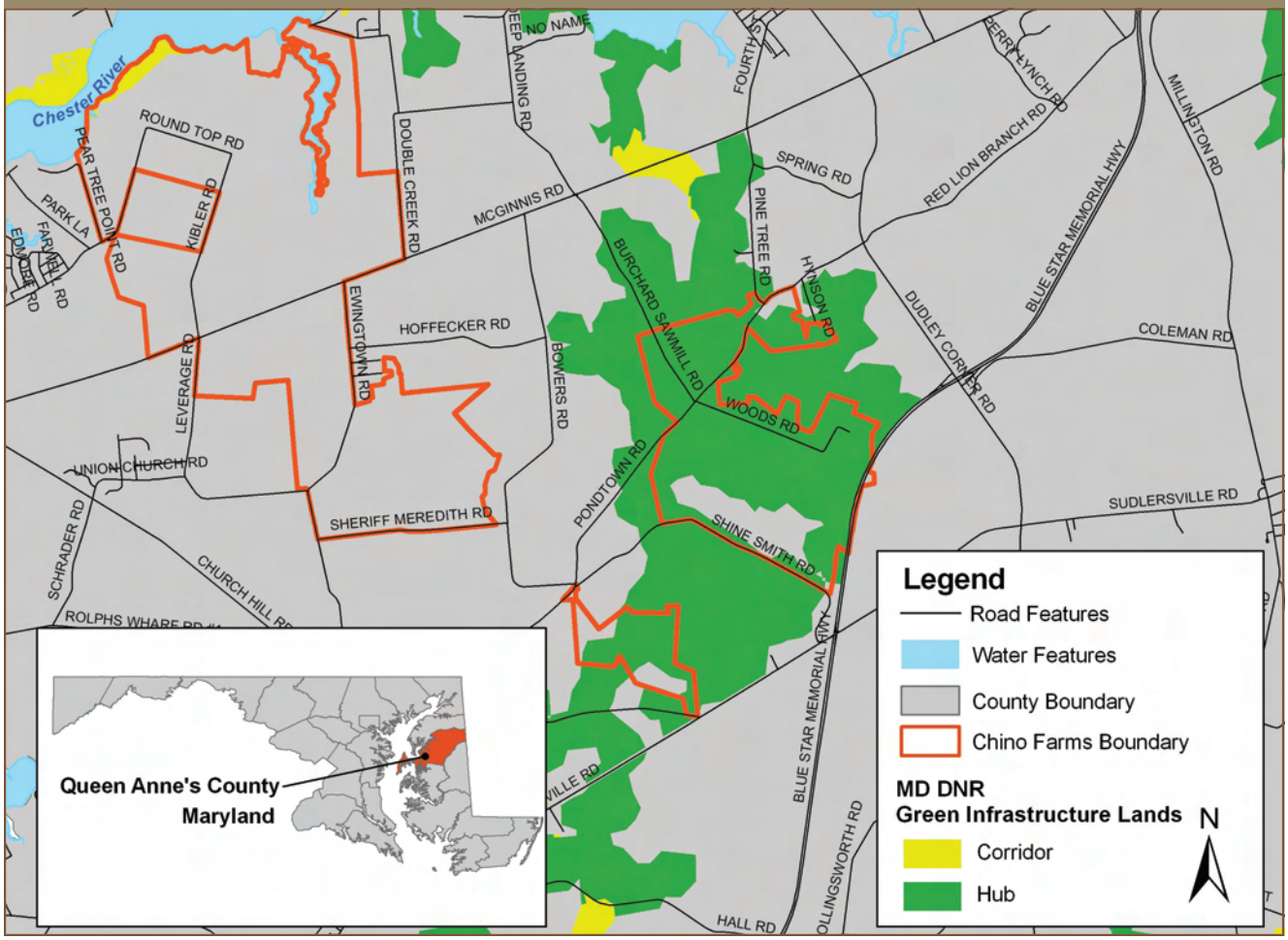
Arguably, one of the greatest achievements highlighted in this case study is the protection of the fast disappearing Eastern Shore agricultural landscape. To help improve water quality, preserve forestland and stabilize this and nearby farms, Dr. Sears worked closely with many partners to conserve Chino Farms and initiate a state Rural Legacy Area that has secured thousands of farmland acres.

RESOURCE MANAGEMENT CHALLENGE

Chino Farms is three miles from historic Chestertown in an area that has seen an increasing number of scattered rural home subdivisions. Dr. Sears sees the subdivisions as a threat to both the rural character of the area as well as the productive agricultural lands in and around Foreman Branch Rural Legacy Area. Chino Farms was first acquired by the family in 1939. Back then it was less than one-tenth the size it is today. At that time, Henry's father used the farm as a gathering place for his friends from New York who made the journey to the Eastern Shore to enjoy the challenge of hunting the once plentiful and diverse array of waterfowl species found along the Chester River fringe marshes, including redheads (*Aythya americana*), canvasbacks (*Aythya valisineria*) lesser scaup (*Aythya affinis*) and greater scaup (*Aythya marila*).

According to most wildlife biologists, the decline of waterfowl in the Chester River coincided with the disappearance of submerged aquatic vegetation (SAV) which was once plentiful along Chesapeake Bay tributaries in the 1950's and 1960's. Like many areas around the Chesapeake Bay, the Chester River has lost SAV stands due to poor water clarity resulting from excess nutrients that cause algal growth, suspended sediment in the water column and other factors. In part, this was fueled by the

Chino Farms Green Infrastructure Lands



change from small animal husbandry farms to very large row crop farms.

Starting in the late 1960's and '70's, local farming practices included liberal use of pesticides and herbicides. In 2000, the Environmental Protection Agency's Chesapeake Bay Program characterized the Chester River as an Area of Emphasis[1] for toxic pollution because available water and sediment toxicity data and the elevated levels of a few pesticides and metals in some areas of the river indicated the potential for adverse effects on living resources. Two banned pesticides, dieldrin and dichlorodiphenyltrichloroethane (DDT), were found in portions of the Upper Chester River sediments and may have contributed to some of the adverse biological effects observed by researchers.

An additional resource management challenge in Queen Anne's county is maintenance and improvement of forest and non-tidal wetland resources. Only 15% of the land in Queen Anne's county is forested – the smallest in the state of Maryland – and from 1986-1999 forest cover in the county declined by 34.2%.[2] Delmarva Bays, unique non-tidal wetland ecosystems designated a State Special Concern, are found in relative abundance in Queen Anne's county, yet many of these 16,000 to 21,000 year old interdunal wetland systems have been drained, cleared or contoured for agricultural purposes.[3] Dr. Sears reports that several Delmarva Bays at Chino Farms had been farmed historically, however they are no longer used for agricultural production and are currently protected through natural vegetated buffers.

Dr. Sears also worries that increasing habitat loss and harassment from encroaching human populations will put significant pressures on bald eagles (*Haliaeetus leucocephalus*). Bald eagles are making a comeback on Chino Farms with nesting pairs frequently sighted in various locations on or near the farm. In an effort to rescue declining bald eagle populations stressed by hunting, habitat loss and DDT, the Federal government placed the eagles on the endangered species list and banned DDT in 1972. As their populations recovered, the government first lowered their status to threatened. Then, in June of 2007, bald eagles were removed from the list. Now, development around nest

Chino Farms grasslands plantation looking north toward the Chester River.

sites may proceed without contacting the U.S. Fish and Wildlife Service—although projects must conform with published guidelines.[4] The bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Protection Act.

Prior to European settlement, native grasslands were part of the landscape, but they have been nearly eliminated from much of North America. Dr. Sears points out that pre-colonial Native Americans were instrumental in maintaining grasslands for hunting and that these habitats were believed to be more abundant in the mid-Atlantic. Due to fire suppression, widespread agricultural operations and other factors, few native grasslands now exist in the Chesapeake region. Sears stated there are no remaining examples of Eastern grassland coastal savanna and prairie communities and grassland dependent bird and wildlife species have been greatly diminished. Native grasslands are also referred to as warm season grasses, prairie or "bunch" grasses. They have deep root systems, grow in clumps and are an important habitat type for a variety of wildlife including birds, mammals, amphibians and reptiles. They grow best and are the greenest in appearance when temperatures are high.

Cool season grasses were introduced to North America because they were easily established and managed, provided good early season forage for domestic livestock and could be closely grazed. Cool season grasses, like Kentucky bluegrass (*Poa pretensis*) and tall fescue (*Lolium pretense*), have limited wildlife value and are the greenest and grow best in spring and fall temperatures.

CONSERVATION VISION

Given the number of resource management challenges in and around Chino Farms, the farm management team is interested in contributing ideas and solutions that improve the environment and help area farmers stay in business. The management team's conservation vision is broad but centered on:

- maintaining a model, certified organic farm operation that will eventually target the production of more specialized, locally consumed niche crops with higher commercial value;
- taking advantage of market based opportunities to convert untapped agricultural and forest products to cash crops for local energy production;
- providing a diverse array of habitat types to support resident wildlife populations and exploring management techniques that facilitate the return of former plant and wildlife species once abundant in the area; and
- strategically restoring important forest patches and corridors that reconnect fragmented stands and link them to major contiguous forestlands within and beyond Chino Farms.

Dr. Sears is a businessman who supports holistic thinking about sustainable land management with a "triple bottom line" approach that yields ecological, economic and social benefits. He is actively seeking practical solutions to creating low cost, low impact energy sources that use materials available on his and other farms like wood, agricultural waste, and switchgrass – which are grown in abundance at Chino Farms. Under the right circumstances, Henry envisions a small renewable energy facility on his farm that produces power for the local community from agricultural and forest products.

IMPLEMENTATION RESOURCES

Returns generated from ongoing farm operations have produced the funds needed to maintain and expand the organic agriculture side of the business and conduct the bulk of the habitat restoration and enhancement projects. The US Department of

Agriculture's (USDA) Conservation Reserve Program and Conservation Reserve Enhancement Program has provided funding for reforestation and grassland restoration. An additional sum of several million dollars was assembled through a variety of partners (see details below—Farm Preservation and Smart Growth) to enable permanent protection of the farm.

Chino Farms has become the host of several academic and government research and management projects that greatly informed and benefited the conservation approaches used on the farm. Extensive studies are being conducted by the University of Maryland and Washington College, including: research on grasslands and their associated management regimens; seed bank productivity on grasslands and other selected plots; the ecology and behavior of the grasshopper sparrow (*Ammodramus savannarum*) and northern bobwhite (*Colinus virginianus*) both at-risk grassland bird species; and, soil organic and chemical properties analysis on uncultivated areas to contrast soil fertility and seed bank contents with agriculturally managed areas. Dr. Sears is quick to cite the contribution of Dr. Douglas Gill, University of Maryland, Department of Biology – who initiated interest in the now on-going suite of research projects centered on the restored grasslands habitat. An important technical assistance effort was also directed towards restoration of green infrastructure forest components on agricultural lands.

CONSERVATION STRATEGY

The farm management team pursued a multi-tiered approach to conservation at Chino Farms. The four major elements of their conservation strategy include:

- maintaining an on-going, certified organic farming operation
- preserving the farm in perpetuity and advocating smart growth
- using managed grasslands to promote wildlife and plant diversity
- restoring forest and wetland green infrastructure

Organic Farming: The move toward organic farming at Chino farms was a perfect fit for a progressive management team that understood the complementarity between sustainable agriculture practices and good natural resource management.

The northern portion of Chino Farms borders the scenic Chester River a short distance upstream from historic Chestertown, Maryland.

Key motivations guiding the organic farming operation include:

- growing safer, healthier crops
- protecting bird, fish and wildlife habitats and aquatic resources on the farm and in the adjacent Chester River riparian ecosystem
- reducing the level of nutrient and pesticide loadings affecting ground and surface waters

The first decision made by management was to start organic farming practices on a small portion of Chino farms to gain experience and confidence. Among other requirements, the move to organic farming involves managing the land and soil for three years using only accepted inputs and practices before it can be certified organic. In 2003, the management team began this 3-year transition process on a 24 acre field that was initially planted with red and white clover to smother weeds, retain more carbon in the soil profile, and to build residual soil nitrogen for future crop production.

Next, management systematically positioned organic farm fields adjacent to major water bodies of the farm to reduce potential pollutant loads. Finally, operations were expanded to include production of organic green peas for the frozen food market and organic corn and soybeans for grain. At present, 60 acres of the farm are certified organic by the Maryland Department of Agriculture and another 56 acres are in the second transitional year of alfalfa production.

Farm Preservation and Smart Growth: Expansion of the farm to its present size occurred gradually over decades during which both economic and conservation issues were paramount. Dr. Sears, a lifelong conservationist, wished to conserve the farm in perpetuity. In 2001,

Encroaching development (left) on Chino Farms (right).

he was able to buy out the other ownership interest in Chino, with funding obtained through the sale of a 5,031 acre conservation easement now held by the State of Maryland. At that time, the easement was the largest in Maryland's history. A plan which included this sale and other transactions was developed by The Conservation Fund in collaboration with the North American Wetlands Conservation Council, Maryland Department of Natural Resources and Queen Anne's County. The easement, a transaction in excess of $8 million dollars, was the cornerstone to establishing what was then called Chino Farms Rural Legacy Area – now known as Foreman Branch Rural Legacy Area. The Rural Legacy Program was created in 1997 to protect large, contiguous tracts of Maryland's most precious cultural and natural resource lands through grants made to local applicants and cooperative partnerships between the state, local governments and land trusts.

Beyond the preservation of Chino Farms, Dr. Sears is a strong advocate for smart growth and the maintenance of rural character of Maryland's Eastern Shore towns and farmlands. Dr. Sears is concerned that sprawling developments outside of nearby Chestertown are threatening both sensitive wildlife species, like the bald eagle, and local farm operations. Taking a stand against encroaching developments bordering Chino Farms, Grassland Plantation, Inc. (an academic research partnership of Chino Farms and an entity Sears is a part of) took legal action against the proposed subdivision of an adjacent 270± acre farm into 51 residential lots. The defendant party's subdivision initially called for 120 units on 267 acres of prime farm land directly adjacent to a tributary stream running within a half-mile of the Chester River. The subdivision was also next to a wood lot on Chino Farms that had been preserved because it contained a bald eagle's nest and Delmarva fox squirrels (*Sciurus niger cinereus*) tagged by Maryland Department of Natural Resources. A unanimous, favorable ruling of Maryland's Court of Appeals required the Queen Anne's County's Board of Appeals to determine whether the increased density of the proposed development was greater than it should otherwise be under the county's Comprehensive plan. The Maryland Court of Appeals ruling reversed three preceding adjudications and ordered the County Board of Appeals to consider all of the issues raised by Grasslands Plantation, Inc. To date, the developer has taken no further action and has not requested a hearing before the Board of Appeals. There are a number of obstacles that would make further development unlikely or difficult.

Managed Grasslands: Establishing and managing warm-season grasslands to increase wildlife and plant diversity are core elements of the Chester River Field Research Center, Grassland Plantation, Inc., Dr. Gill and James Gruber, principal of the Foreman's Branch Bird Observatory. This innovative partnership ensures that effective conservation ideas are put into practice.

In 1997, Chino Farms and Dr. Gill convened a conference of regional wildlife management specialists from both the government and private sectors to explore what was known about grassland research under the new U.S. Department of Agriculture conservation programs such as the Conservation Reserve Program. Recognizing then that grassland species were in steep decline, attendees discussed, among other topics, how to replicate a grassland that would function in a biologically similar manner to Eastern grasslands that existed prior to colonial settlement.

As a result of the conference, in the spring of 1998, Dr. Sears participated in and financially contributed to a long term study, now in its eleventh year, of native warm season grasses at the farm. In his role as Scientific Director of the newly created Chester River Field Research Center, Dr. Gill was the lead researcher and designed the study to:

Chino Farms Grasslands Field Plots

- observe how well grassland plants, birds and wildlife responded to different grassland vegetative communities and management practices
- develop practical methods for grassland restoration and management in the Eastern United States

The research team lead by Gill used the grasshopper sparrow, a grassland dependant bird species, as one of the biological indicators for the comparison of various grassland management practices. A 228 acre native grassland restoration site was established in 1998 with 12 different fields designated for varying grass plant communities and management techniques such as prescribed burning, herbicide applications for noxious weed control, and replanting different plant species assemblages.

The initial mix of grasses included eight warm season grasses including: big bluestem (*Andropogon gerardii*), sideoats grama (*Bouteloua curtipendula*), deertongue (*Dichanthelium clandestinum*), switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), indian grass (*Ischaemum indicum*), eastern gamagrass (*Tripsacum dactyloides*), broomsedge (*Andropogon virginicus*), coastal panicgrass (*Panicum amarum*) and two cool season grasses—red fescue (*Festuca rubra*) and tall meadow fescue (*Lolium pretense*).

All ten of the planted grass species were readily established and began seed production by the close of the second growing season. Switchgrass aggressively reproduced and was rapidly crowding out other grassland species. The researchers concluded that switchgrass should be eliminated from or greatly reduced in native grassland seeding mixtures. Many other valuable lessons learned and detailed scientific results are discussed in a peer reviewed paper published by Gill and his colleagues in the Wildlife Society bulletin.[5]

Forest Restoration: In order to reduce nutrients and sediment entering the Chesapeake Bay and its tributaries, the State of Maryland established ten Tributary Strategy Teams comprised of governor-appointed representatives from the business community, farmers, foresters, watermen, non-governmental and governmental organizations. One of these teams, the Upper Eastern Shore Tributary Team, wanted to create a restoration demonstration project that would provide water quality and habitat benefits; and show how multiple partners can work together.

The Tributary Team used Maryland's Green Infrastructure Assessment as the basis for identifying candidate restoration sites. This team identified several potential locations where restoration efforts would yield multiple ecological benefits due to their strategic location within the forested green infrastructure network. To enhance the ecological functions and value of the existing forest, a wetland and terrestrial planting plan was formulated which reduced the amount of forest edge area, increased interior forest area and formed a connection between some of the largest remaining contiguous forest tracts in the Upper Eastern Shore.

Several landowners were contacted to gauge their interest in having restoration on their properties. Fortunately, Chino Farms was the site that promised the greatest ecological benefit from restoration and Henry Sears was more than willing to collaborate. Dr. Sears first heard of the green infrastructure concept through his colleague Patrick Noonan, founder and Chairman Emeritus of The Conservation Fund and former president of The Nature Conservancy. Noonan told Sears that "the green infrastructure conservation concept would be a driving force for land protection in the 21st century." Maryland Department of Natural Resources helped the Tributary Team, Dr. Sears, Queen Anne's County, and a local consulting firm to implement reforestation and wetland restoration on 52 acres.

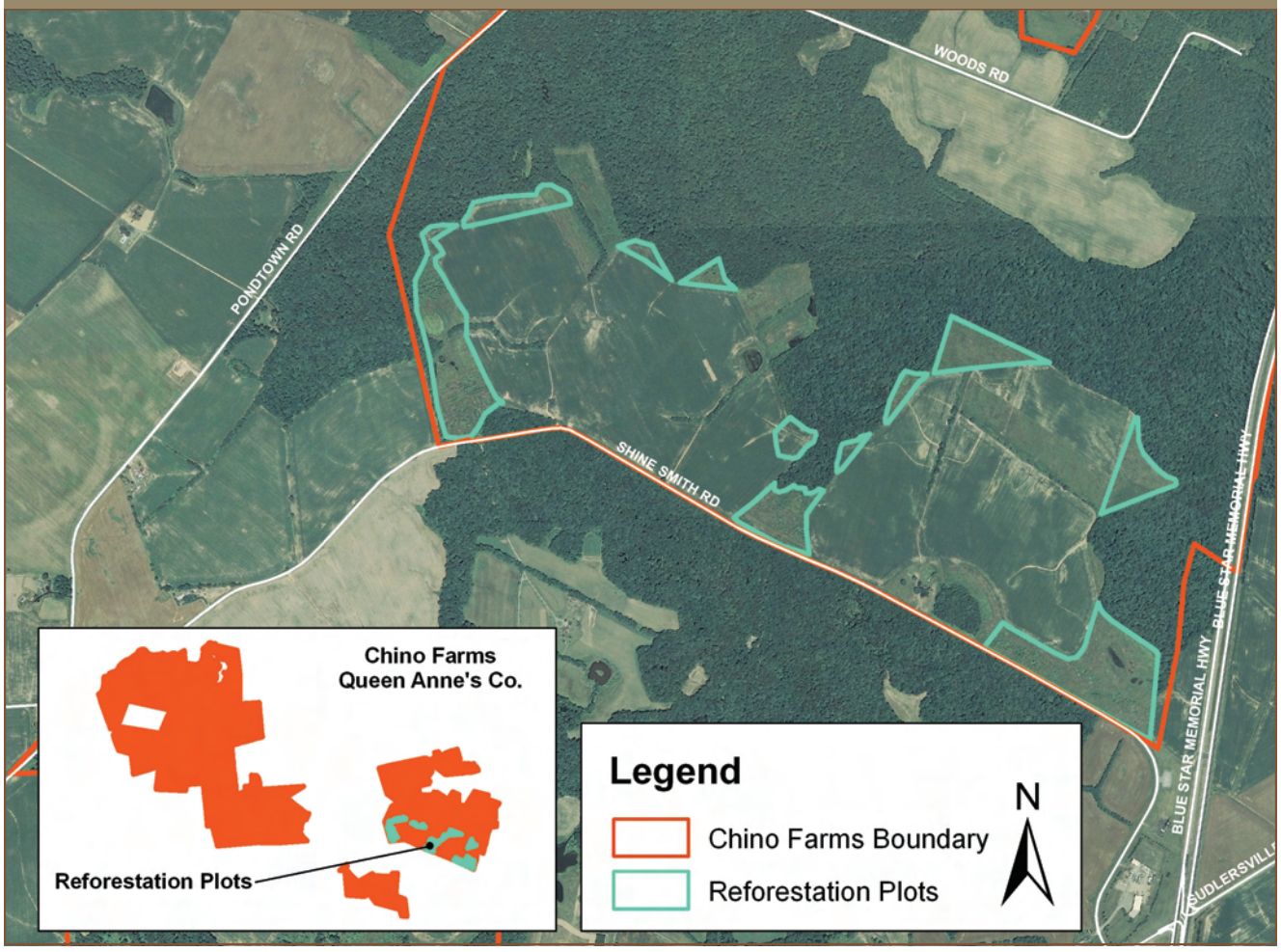
DNR provided a $12,000 habitat restoration grant and Queen Anne's County donated matching funds from their "fee in lieu" program, which collects payments used to replant cleared forestlands when losses can't be replanted by developers. The Chino Farms project represents a rare example where a private landowner has participated in a restoration effort specifically designed to reconnect a regionally significant forest landscape.

RESULTS

Anyone who has toured Chino Farms immediately recognizes this is no ordinary farm. The picturesque setting and great variety of forests, wetlands, grasslands, expansive organic corn and soybean fields and waterfront shoreline make a memorable impression. Notable results achieved by the Chino Farms management team and their partners include:

- Establishment of the Chino Farms easement which ensured the protection of more than eight square miles of critical riparian habitat including 100 acres of unique Delmarva Bays, nearly 4 miles of historic Chester River shoreline, a 90-acre waterfowl sanctuary, and important habitat for bald eagle and endangered fox squirrel.
- Reconstruction of an extremely rare, 228 acre mid-Atlantic native grassland habitat, which has been effectively stabilized through a variety of management practices. This habitat hosts extensive grassland-nesting bird species populations, particularly the grasshopper sparrow, which returns to the site year after year.
- Documentation of the most cost-effective and successful grassland management protocols that help government resource management agencies, researchers and habitat creation specialists replicate the core design, creation and management practices landowners can use to restore productive grassland landscapes across the mid-Atlantic. This activity is an on-going, work in progress which addresses new issues as they come into focus.
- Prevention of an attempt to develop 275 acres of farmland adjacent to Chino Farms, setting a legal precedent that will likely benefit future farmland conservation efforts in the area.

Chino Farms Restoration Plots



- Planting of 36,000 trees on 65 acres of restored forestlands that now connect and enhance some of the largest forestland systems in the area—enhancing water quality and wildlife habitat.
- Achieving Certified Organic farm status on 60 acres of land for corn production through the Maryland Department of Agriculture.

KEYS TO SUCCESS

The various successes at Chino Farms can be attributed to several factors, including:

Strong farm management: Farm manager Evan Miles oversees the day-to-day operations at Chino Farms with the continuing goal of balancing the efficiency and effectiveness of the farm while protecting natural resources.

Access to scientific research: Dr. Gill and his research team have posed critically important research questions regarding native grasslands, which have lead to successful approaches for the design, creation and management of grasslands at the farm and elsewhere in the region. In addition, the strong association with the Maryland Department of Natural Resources and the Upper Eastern Shore Tributary Team produced a one-of-a-kind green infrastructure forest restoration plan.

Profit motive not paramount: The farm business must maintain a profit margin that carries the basic costs of the operation, but it is not the fundamental driver of decision-making. Maintaining the long term sustainability of Chino Farms is an overriding concern that motivates Dr. Sears and his management team. An equally compelling theme that makes the farm successful is the long term mutual support the Chino Farms team has in their respect for one another and concern over the stewardship of the farm.

Curiosity and love of learning: At several points in time, Dr. Sears has redirected his energies into new exploratory pursuits that promote conservation. A current topic of interest is the potential designation of the Chester River as a connector trail of the John Smith Chesapeake National Historic Trail. Sears believes the trail will foster greater appreciation for the need to protect and better manage lands bordering the trail.

PHOTOS AND FIGURES

All photos by David Burke
Page 108: Figure, Burke Environmental Associates/The Conservation Fund
Page 111: Image, Google Earth
Pages 112, 113: Figures, Burke Environmental Associates/The Conservation Fund, using Google Earth images

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Visit www.chesterriverfieldresearchcenter.org to find academic papers produced by researchers investigating Chino farms.