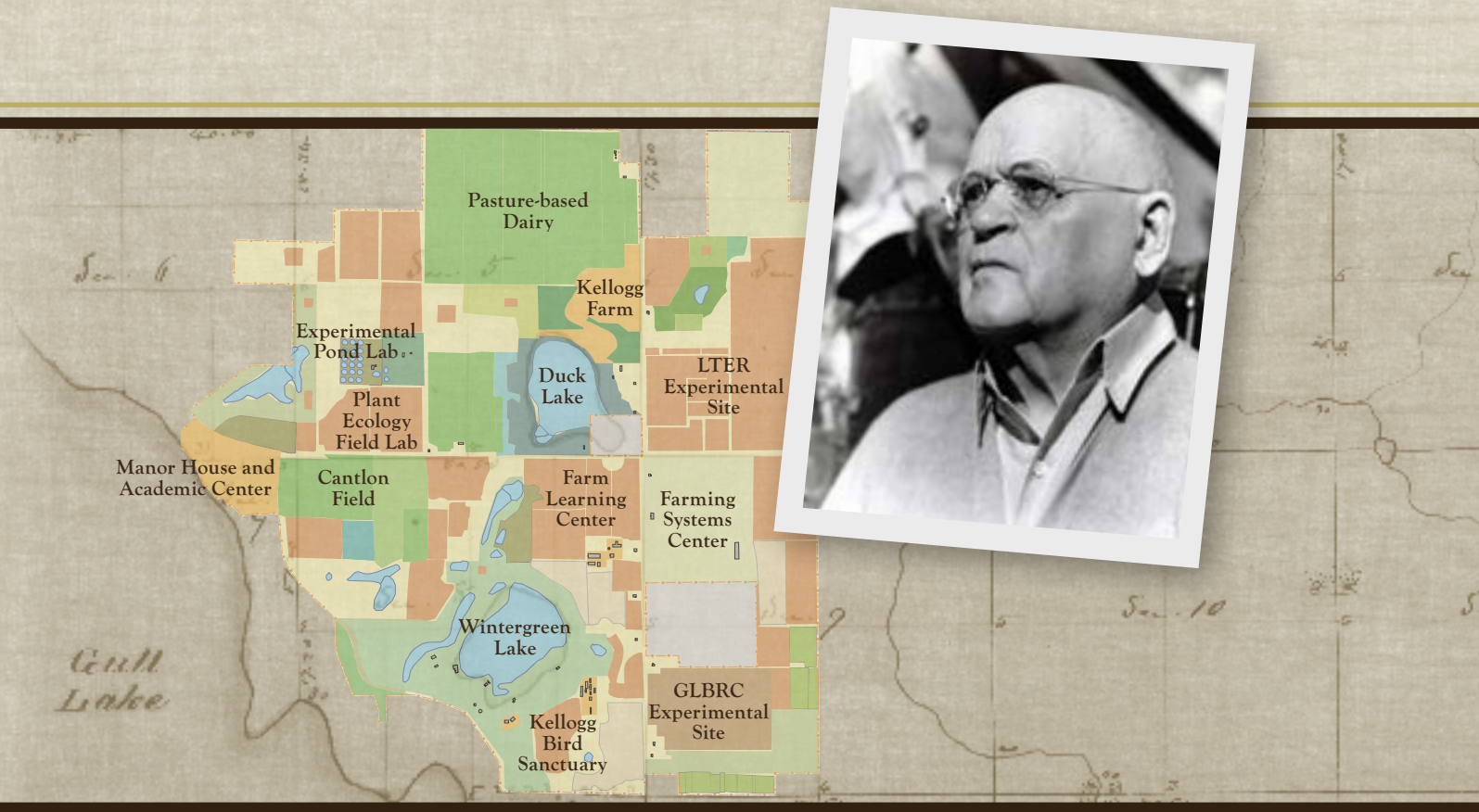
In the FOUNDER'S FOOTPRINTS

A History of Michigan State University's W.K. Kellogg Biological Station



Danielle C. Zoellner and Katherine L. Gross

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CONTRIBUTORS
Barbara Baker
Bonnie Feldkamp
John Gorentz
Katherine Gross
Stephen Hamilton
Michael Klug
George Lauff
Gary Mittelbach
Danielle Zoellner

ARCHIVAL SUPPORT
Abbey Buckham
Melissa Yost

GRAPHIC DESIGN CONSULTING
Mary Haskin Designs, LLC

COVER DESIGN
Mary Haskin Designs, LLC

COVER MAP
John Gorentz & Suzanne Sippel

COVER MAP CAPTION
Map of the current land use and key facilities of the W.K. Kellogg Biological Station overlaid on a General Land Office (GLO) plat map of the area around KBS derived from the original surveys of the area done by John Mullett in 1826.

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This version, published in April 2020, includes revisions to correct some photo attributions and minor errors in the text.

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Self-published.
info@kbs.msu.edu

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Dedicated to Dr. George Lauff, whose vision and commitment made this project possible.

CONTENTS

ACKNOWLEDGEMENTS

First and foremost, we would like to thank Dr. George Lauff for his leadership as the first resident faculty director of the W.K. Kellogg Biological Station (KBS) and for providing the generous donations that made this project possible. Also, a big thanks to the original KBS "History Committee" — Dr. George Lauff, Dr. Michael Klug, John Gorentz, Nina Consolatti, Melissa Yost and Barbara Baker — whose efforts in the project's formative stages defined its vision and scope. Bonnie Feldkamp worked with the committee to draft initial chapters of this book. Dr. Danielle Zoellner led efforts to write and revise many of the chapters and worked with Melissa Yost to develop the KBS archive where many of the documents used for this project are now stored. Dr. Katherine Gross' leadership was important to the completion of the project and assuring that the vision of Lauff to produce a book that documented the history and legacy of KBS was fulfilled.

We would also like to thank W.K. Kellogg and the W.K. Kellogg Foundation (WKKF) for the gifts of lands, facilities, and grants to support the establishment and growth of KBS over the past 90 years. Of course, KBS would not have been possible without the commitment of leadership at Michigan State College/University (MSU). Investments by MSU in faculty, facilities and support staff continue to make KBS a valuable asset to the University and to communities both local and global.

We also thank staff at the MSU Archives, WKKF Archives, Richland Library, and Willard Library in Battle Creek for their assistance in locating and providing access to historical materials. And finally, special thanks to all those who shared stories and photos from their time and experiences at KBS.

While KBS is a place, it is the people who work here and contribute to the development and fulfillment of the mission that continue to make KBS extraordinary.

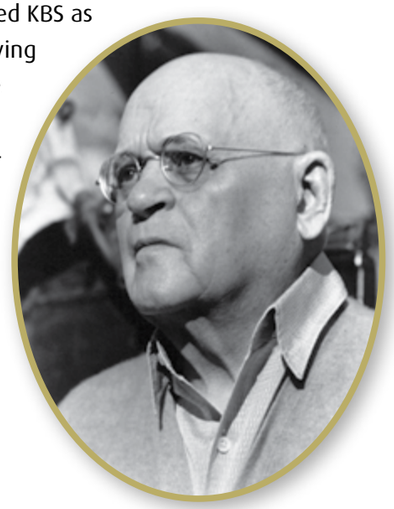
PROLOGUE

by Dr. George Lauff
KBS Resident Director and Faculty, 1964 –1989

The evolution of Michigan State University's (MSU) W.K. Kellogg Biological Station (KBS) is intertwined with the burgeoning conservation and environmental movements, the development of a land-grant college into a research university and the growth of ecological sciences. From its beginning, rooted in conservation and education, to its present state as a major institution for research, education, outreach and natural resource stewardship, KBS has been a unique place. While the station's leadership has a long and varied past, it is currently administered and supported jointly by MSU's Colleges of Agriculture and Natural Resources (CANR) and Natural Science (NatSci).

The history of biological field stations stretches back to the early 1800s, when it was recognized that studying nature in a classroom was impractical, and teachers were increasingly moving into natural settings. The growing concept of outdoor, field-based learning fostered the development of marine and inland biological field stations around the globe. The first U.S. inland field station was established in 1895 at Turkey Lake, Indiana.

In their 1966 article in *BioScience,* Arvey and Reimer indicated that of the 53 inland field stations established in the U.S. by 1945, only 20 survived into the mid-1960s. Though the number of inland biological field stations grew until World War II, many found it difficult to maintain their internal infrastructure following the war. In addition, stations were often privately funded and once the initial benefactor moved or passed away, the station failed. Other stations closed due to disagreements over mission or leadership. While it is unclear if Arvey and Reimer designated KBS as one of the surviving 20 stations since Mr. Kellogg had donated the Kellogg Bird Sanctuary, Farm and Forest to what was then known as Michigan State College (MSC) in the late 1920s,



W.K. Kellogg in the 1930s. PHOTO: WKKF

KBS claimed its place on a fairly exclusive list of only 42 recognized U.S. inland biological field stations in the 1966 publication.

KBS has had many advantages during its development that did not exist for other stations. First, the early land base was generously donated to MSC (now MSU), by cereal magnate W.K. Kellogg. Second, the Station has enjoyed a remarkable amount of institutional support from MSU since its beginning. Third, KBS has also had significant support from the W.K. Kellogg Foundation (WKKF) that has helped shape the Station into what it is today. Importantly, the landscape surrounding KBS offers a wide diversity of ecosystems and habitats so that nearly any ecological researcher or instructor can find an appropriate site to conduct investigations or to use as an outdoor classroom.

During its formative years in the 1950s, KBS research was primarily conducted by visiting scientists who instructed summer biology courses. Summer activities demonstrated the Station's potential for research, but did not provide the continuity needed for a sustained program. To tackle this problem, in 1963, MSU made the unprecedented commitment to establish

Dr. Robert Wetzel and Dr. Alan Knight with graduate students Whit Gibbons, Don McGregor and others on the KBS aquatic research boat in Gull Lake during the late-1960s. PHOTO: Michigan State University Archives and Historical Collections

Students in the Wetland Ecology and Management course at KBS (Summer 2014) learning about wetland plants from Dr. Steve Hamilton, KBS resident faculty. PHOTO: KBS

a full-time resident director and faculty at the Station. This commitment was integral to KBS' development beyond a summer school site, because at the time, most full-time staffing for U.S. inland field stations consisted of maintenance personnel.

During the 1960s and 1970s, it was becoming apparent that booming population growth, suburban development and industrial pollution were having increasingly negative impacts on natural resources. Rachel Carson's book *Silent Spring* fostered a growing public awareness of environmental issues created by expanded industrial development and increased use of agricultural chemicals. In response to growing evidence that unfettered human development was degrading the environment and affecting human health, the U.S. Congress passed the Clean Air Act of 1963 and the Clean Water Act of 1972.

At the same time, national and international scientific and non-profit organizations began recognizing that there was a dire need for long-term studies of ecological processes. The KBS legacy of long-term ecological research began in 1977 when the site was designated by the American Association for the Advancement of Science (AAAS) and the National Science Foundation (NSF) as an Experimental Ecological Reserve (EER).

Eleven years later, KBS was designated by the NSF as a Long-Term Ecological Research (LTER) site specifically to understand the ecological and biological processes that are important in row

Dr. George Lauff, KBS Director and faculty from 1964 through 1989, collecting samples from the shore of Gull Lake in the mid-1960s. PHOTO: Michigan State University Archives and Historical Collections

crop agriculture. Because most research on agricultural systems is typically funded through the U.S. Department of Agriculture (USDA), the move by NSF to fund agricultural research was extraordinary, but timely, as there was growing interest in developing options to promote sustainable agricultural systems.

For over 30 years, KBS has been the only LTER site devoted to agricultural systems. The faculty and staff members associated with the KBS LTER have made major contributions to our understanding of how agricultural and natural ecosystems interact, and have also led the way to developing more sustainable practices in row-crop agriculture. A book summarizing the research of the KBS LTER and advancing our understanding of sustainability of these systems, *The Ecology of Agricultural Landscapes: Long-term Research on the Path to Sustainability,* was published in 2015.

It was through the foresight of W.K. Kellogg, who donated the original land base, the MSU administrators who acted to realize the potential of this gift, and the hard work of many faculty members, students, staff and visiting researchers that KBS has become an internationally recognized leader for ecological research in managed and natural ecosystems. KBS also

A visiting KBS graduate student researcher utilizing a rain-out shelter in the LTER during summer 2015. Rain-out shelters have been deployed in LTER plots to mimic increased drought conditions predicted by climate change models for the U.S. Midwest. PHOTO: KBS

Summer 2017 KBS undergraduate research and internship program students before their capstone symposium where students present their summer work to peers and the community. PHOTO: KBS

has a strong tradition of excellence in education and outreach and provides exceptional learning opportunities for students of all ages and strong partnerships with K-12 schools. Funding from MSU, the WKKF and other foundations, donors, and external funding agencies supports exceptional programming that ensures that the mission of KBS can expand in scope and influence well into the future.

In the

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Chapter One

The Beginnings of the Station

The development of the W.K. Kellogg Biological Station (KBS) from field, forest and farmland to a nationally and internationally recognized center for ecological research, education and outreach can be traced back to the motivations of cereal magnate W.K. Kellogg. Kellogg acquired the land in the 1920s and quickly began restoration projects that remain a hallmark of KBS today.

Raised in Battle Creek, Michigan, as a Seventh-day Adventist, Kellogg valued personal health and the wellness that fresh air and sunshine could foster. He was not only a successful businessman, but also a passionate conservationist who recognized an opportunity to put emerging strategies for conservation-based land management into practice.

Early settlers had freely harvested trees and wildlife without understanding the repercussions of unlimited consumption. In 1897, Michigan's logging volume reached 162 billion board feet and by 1900, more than half of Michigan was deforested. The southern Michigan "hardwood belt" was one of the first to be cleared for farmland. In 1881, 1 million acres of forest burned in the state's Thumb region, with more major fires happening in the same area 10 years later. Early loggers depleted thousands of acres of white pines across the Upper Peninsula, while settlers drained wetlands in an unsuccessful attempt to create more farming areas.

Hunted for sport, food and fashionable feathers, it became evident that native birds were disappearing with widespread effects. Protected habitats were minimal, farmers worried that insect pests would overtake their crops for lack of birds to eat them, hunters worried about the shortened food supply, and wildlife groups worried about the loss of beauty and abundance of nature they once knew, but the harvest native birds continued.

Migrating flocks were easy targets, especially when flying north in the spring to nest. Both Canada and the United States recognized the need to protect these birds and collaborated to help curb hunting pressure. In 1916, the United States and Great Britain (on behalf of Canada) signed the Migratory Bird Convention as a first

Battle Creek, Michigan, native, cereal magnate and philanthropist W.K. Kellogg in the 1930s. PHOTO: WKKF

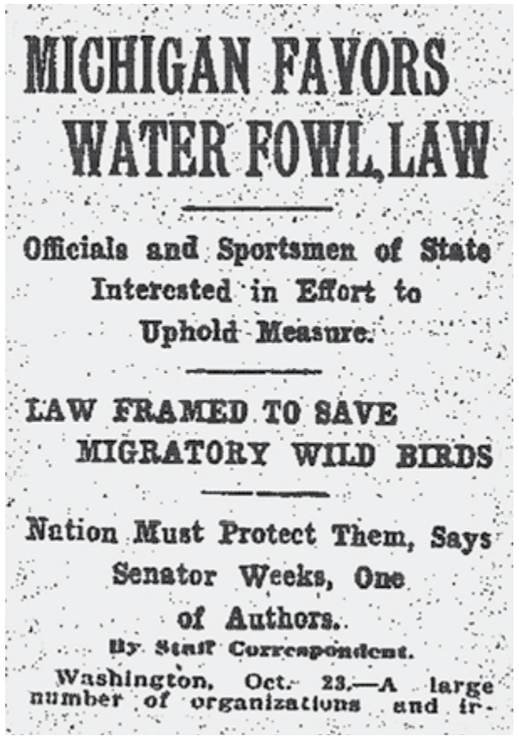
He (Kellogg) was not only a successful businessman, but also a passionate conservationist who recognized an opportunity to put emerging strategies for conservation-based land management into practice.

step in conserving birds for future generations. This document legitimized the need to protect migrating birds, but lacked an enforcement mechanism. In 1918, the U.S. signed the Migratory Birds Convention Act, designating enforcement authority to the U.S. Biological Survey, and Canada signed the Migratory Birds Treaty Act, designating its enforcement authority to the Canadian Department of the Interior.

Concern for forests and wildlife grew across the U.S., and the country began to shift toward a new era of natural resource conservation. Kellogg conferred with experts and leading conservationists like Canadian waterfowl expert Jack Miner on ways that he could preserve waterfowl in the area. Kellogg was also aware of Aldo Leopold's work in wildlife management.

Local chapters of the Izaak Walton League and the Audubon Society began forming as the need for conservation efforts was better understood. Federal and state hunting regulations were established, lands were reserved for wildlife and interest grew in restoring habitats and game birds. At the same time, Kellogg began developing plans for acquiring land that would aid the

An October 15, 1915, article from the Detroit Free Press indicating that the people of Michigan were largely supportive of the efforts to protect migratory water fowl.
IMAGE: KBS Archives



MICHIGAN FAVORS
WATER FOWL LAW

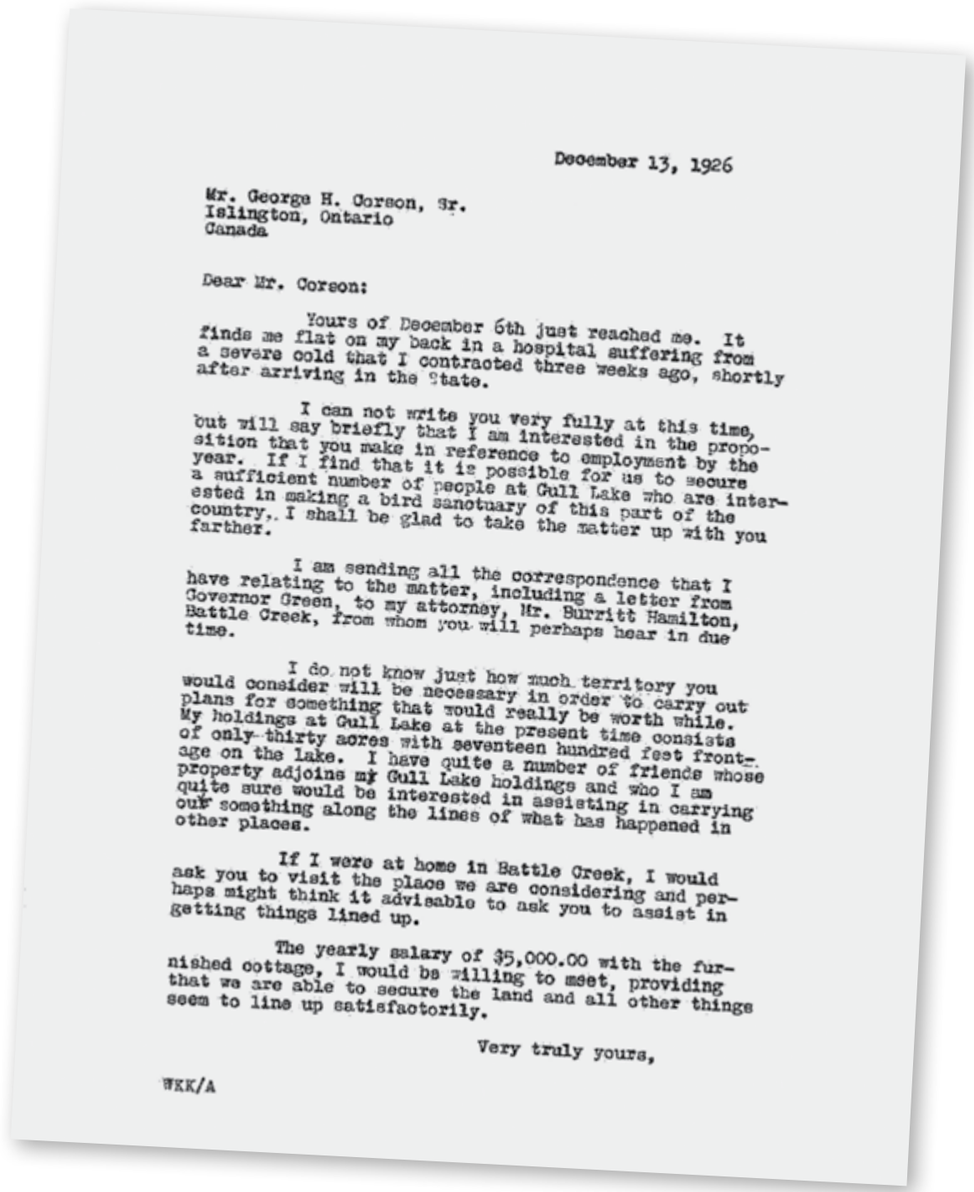
Officials and Sportsmen of State Interested in Effort to Uphold Measure.

LAW FRAMED TO SAVE MIGRATORY WILD BIRDS

Nation Must Protect Them, Says Senator Weeks, One of Authors.

By Staff Correspondent.

Washington, Oct. 23.—A large number of organizations and ir-



December 13, 1926

Mr. George H. Corson, Sr.
Islington, Ontario
Canada

Dear Mr. Corson:

Yours of December 6th just reached me. It finds me flat on my back in a hospital suffering from a severe cold that I contracted three weeks ago, shortly after arriving in the State.

I can not write you very fully at this time, but will say briefly that I am interested in the proposition that you make in reference to employment by the year. If I find that it is possible for us to secure a sufficient number of people at Gull Lake who are interested in making a bird sanctuary of this part of the country, I shall be glad to take the matter up with you farther.

I am sending all the correspondence that I have relating to the matter, including a letter from Governor Green, to my attorney, Mr. Burritt Hamilton, Battle Creek, from whom you will perhaps hear in due time.

I do not know just how much territory you would consider will be necessary in order to carry out plans for something that would really be worth while. My holdings at Gull Lake at the present time consists of only thirty acres with seventeen hundred feet frontage on the lake. I have quite a number of friends whose property adjoins my Gull Lake holdings and who I am quite sure would be interested in assisting in carrying our something along the lines of what has happened in other places.

If I were at home in Battle Creek, I would ask you to visit the place we are considering and perhaps might think it advisable to ask you to assist in getting things lined up.

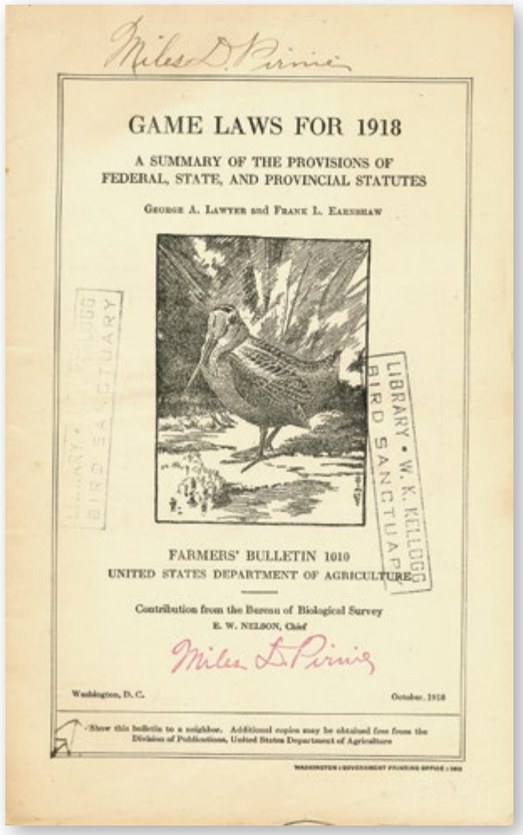
The yearly salary of $5,000.00 with the furnished cottage, I would be willing to meet, providing that we are able to secure the land and all other things seem to line up satisfactorily.

Very truly yours,

WKK/A

December 13, 1926 letter from W.K. Kellogg to George Corsan, who became the first manager of the Kellogg Bird Sanctuary (1927–1930) discussing the possibility of a bird sanctuary and Corsan's interest in the project. IMAGE: WKKF

The U.S. Migratory Bird Treaty Act of 1918 pamphlet that Dr. Miles Pirnie, manager of the Kellogg Bird Sanctuary from 1931 to 1948, kept in his papers at the Sanctuary. This act provided regulation on the taking and killing of migratory birds in response to the near extinction of birds like the Canada goose, and is largely considered one of the first environmental regulations adopted at the federal level in the U.S. IMAGE: KBS Archives


Miles D. Pirnie

GAME LAWS FOR 1918

A SUMMARY OF THE PROVISIONS OF FEDERAL, STATE, AND PROVINCIAL STATUTES

GEORGE A. LAWYER and FRANK L. EARNSHAW

LIBRARY • W. K. KELLOGG BIRD SANCTUARY

FARMERS' BULLETIN 1010

UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the Bureau of Biological Survey
E. W. NELSON, Chief

Miles D. Pirnie

Washington, D. C. October, 1918

Show this bulletin to a neighbor. Additional copies may be obtained free from the Division of Publications, United States Department of Agriculture

reforestation and game bird conservation needs of the state and in providing farmers a way to learn "best and most modern practices."

At the forefront of society and with an understanding of ecology, Kellogg stoked his ideals with the knowledge of the experts available to him and devised his own plans. A new Kellogg legacy was born which was steeped in philanthropic purpose and guided by a burgeoning concern with the fate of our natural resources.

Chapter Two

The Manor House and Estate

W.K. Kellogg's breakfast cereal company did increasingly well, and by the mid-1920s, he was a wealthy man. Kellogg had an ingrained philanthropic sense, and both altruism and compassion showed in his lifestyle. After his grandson suffered a fall from a second story window, Kellogg found that though his wealth made medical bills manageable, it was difficult to find adequate treatment for the boy. His thoughts went to others not as fortunate, as he wrote in a correspondence, "This caused me to wonder what difficulties were in the paths of needy parents who seek help for their children when catastrophe strikes, and I resolved to lend what aid I could to such children."

In 1925, Kellogg established what was then known as the Fellowship Corporation to provide a professional method for distributing donations to the community. That year, he spent his 65th birthday making contributions to the Battle Creek area. These gifts included a civic auditorium and junior high school, a youth building complete with a swimming pool, assistance to the Altrusa Day Nursery for working mothers, a city farmers market, land for a Boy Scout Camp and a grant that established the Ann J. Kellogg School. Named for his mother, the school worked

Hand-carved oak staircase at the main entry of the Kellogg Manor House shortly after completion of the House.
PHOTO: WKKF

1919 advertisement for Kellogg's Corn Flakes.
IMAGE: Kellogg Company

W.K. Kellogg and his second wife, Dr. Carrie Staines Kellogg, in the 1920s. PHOTO: WKKF

to integrate special needs children into mainstream classrooms, a goal that modern schools continue to strive for.

During this time, Kellogg divided his time between Michigan and California. He usually spent winters in California with friends and relatives, though he spent one stretch at the Palm Springs' Desert Inn. Summers were spent at his Van Buren Street home in Battle Creek, Michigan. In 1925, the characteristically frugal man deviated from his modest lifestyle by building two lavish homes. The new Kellogg winter home was a 19-room villa perched atop a small mountain near Pomona, California that overlooked an 800-acre Arabian horse ranch.

Kellogg also began working with Benjamin and Benjamin, a father and son architectural firm in Grand Rapids, Michigan, to begin planning a summer home in the country. He purchased 32 acres of abandoned agricultural land hugging 1,600 feet of shoreline on Gull Lake, a scenic 2,000-acre lake just west of Battle Creek in rural Kalamazoo County. Kellogg named the estate Eagle Heights because of its location on the highest point on the property. Even though his commission called for a lavish, seven bedroom, nine bath, English Tudor style manor house, he often affectionately referred to it as "the cottage."

With plans approved, he supervised progress via correspondence from his California home

Aerial view of the Eagle Heights Estate on the shores of Gull Lake, Michigan, taken in the 1940s. PHOTO: Hart-Dole-Inouye Federal Center Archives

throughout the winter of 1925 to 1926 with plans to occupy the home by August 1926. Kellogg also made frequent visits to Eagle Heights during construction, and approached his homebuilding project with the same attention to detail that he gave all of his work.

A letter from Kellogg to his Eagle Heights contractors detailed the painstaking request for a staircase of the finest affordable solid oak, "dried according to furniture factory methods" and "carved after the design indicated by a strictly first-class furniture carver familiar with English and

W.K. Kellogg and his wife Carrie Staines Kellogg enjoying the fireplace in the living room of the Manor House in 1927 (left); the living room prior to renovation in the 1970s (right). PHOTOS: WKKF (left) and KBS Archives (right)

Gothic carving and woodcraft." Kellogg found his carvers in Grand Rapids, which was a burgeoning center of furniture production at that time.

Mr. Boudewyn DeKorne emigrated from the Netherlands to the U.S. in 1879, at the age of 14, and began working as a hand carver in a Grand Rapids furniture factory. In the early 1900s, he and a friend opened their own carving business named Lindhout and DeKorne Carving Works. Based on Kellogg's specifications, Benjamin and Benjamin recruited DeKorne's company who spent nearly two years carving the ornate oak staircase that still graces the entrance of the Manor House today.

Other details that were incorporated into the house and grounds foreshadowed Kellogg's philanthropic future, as Kellogg took the degraded land and provided the resources needed to make it beautiful and productive. Twenty of the 32 acres on his summer estate were planted with trees and shrubs, many of them rare. It also included a grove of English walnut trees for protein which Kellogg indulged in as an "engrossing hobby." The country home also included a greenhouse, which traditionally signified a self-sufficient manor.

Kellogg's interest in botanical experimentation shone through, as the greenhouse was filled with roses, a grape arbor and citrus fruits. Dr. J.A. Neilson from the Michigan State College (now Michigan State University) advised the Estate's caretakers and furnished plants based on his grafting research. Several of these trees remain on the grounds and the grafting scars are still obvious on many of them.

Kellogg also invested in a sizable orchard, although he did not want to plant young trees that would not bear fruit in time for him to enjoy. He stated, "At my age, you can't wait

Living room of the Manor House following the completion of renovations in 2000. PHOTO: KBS

for trees to grow." Instead he contacted farmers and purchased trees as large as 12 inches in diameter. He prepared large holes for them and transported them in the dead of winter. A friend recalled, "By springtime the trees did not even know they had been moved and bore blossoms and fruit the first year. Perhaps to many the obstacle of moving mature trees might have appeared so great as to cause abandonment of the project, but the difficulty only sharpened the desire of W.K. to get the job done."

Another unique feature of the Estate is the windmill located near the shore of Gull Lake. Benjamin convinced Kellogg to move a windmill from the Netherlands to his estate and argued that it could keep water flowing through the lagoon that had been designed. Two windmills were used to build one that would be operational, shipped and then rebuilt on the grounds. Though the pumping structure is no longer in service, and several updates have been made to the exterior including replacement of the thatched roof and replacement of the blades, the windmill remains a beacon on the shores of Gull Lake to this day.

Though the builders did not meet the August completion deadline, the Kelloggs — W.K. and his second wife, Dr. Carrie Staines Kellogg — stepped over the threshold into their new country home in October 1926. Though they regarded their new summer cottage as their "affectionate

Based on Kellogg's specifications, Benjamin and Benjamin recruited DeKorne's company who spent nearly two years carving the ornate oak staircase that still graces the entrance of the Manor House today.

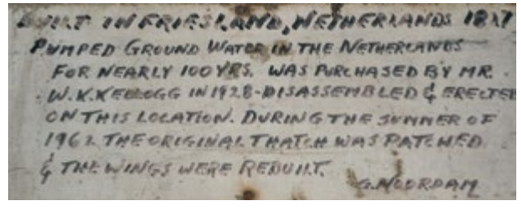
favorite," in May 1927 they deeded the Estate to the City of Battle Creek, stating that they intended it to be a place "where all of Battle Creek may forever play." In their agreement with the city, the Kelloggs were given a lifetime lease on the property. During their summer stays at Eagle Heights, they hosted public lawn parties and music recitals on a $25,000 Skinner pipe organ that had been installed in the House.

Interior of the Estate greenhouse and W.K. Kellogg exiting the greenhouse with plants in-hand in the 1930s. PHOTOS: WKKF

In 1930, the W.K. Kellogg Child Welfare Fellowship Corporation became the W.K. Kellogg Foundation. While keeping his lifelong lease on the Eagle Heights Estate, Kellogg arranged for the deed to be transferred from the City of Battle Creek to his new foundation so that the Estate could be used as a summer camp for children.

In 1934, Mr. Kellogg purchased a fourth home, which was a palm tree-shaded villa in Dunedin, Florida, a small town just north of Clearwater on the Gulf of Mexico. However, after only a few trips to Florida, he decided that California winters better suited him, and he rarely went to Florida, though Kellogg's staff continued to maintain the property in his absence.

The Great Depression did not affect Kellogg's cereal company as much as it did other companies, though some of the banks with which he did business closed and Kellogg felt the impact of financial loss. Owning three lavish homes became a personal strain. The homes, though they were each less than 20 years old, were expensive to maintain. With mounting taxes, compounded by the personal responsibility of staff and upkeep, these homes seemed increasingly excessive to him during a time when many had so little.



The windmill on the shore of Gull Lake in the 1930s, and a handwritten sign posted inside the windmill in 1962 after it was repaired indicating that the windmill was built in 1827 and moved to the Estate in 1928. PHOTOS: WKKF and KBS

Fire department unit formed by former patients of Percy Jones Hospital, relaxing outside the Carriage House (1944).
PHOTO: Hart-Dole-Inouye Federal Center Archives

Kellogg increasingly felt that he and his wife were merely "rattling around in houses" and that they had no need for such luxury. His conscience prompted him to take stock of his lifestyle, which he felt to be more "self-indulgent" than he was comfortable with, even as he continued making generous contributions to surrounding communities through his foundation.

After the Japanese attack on Pearl Harbor, the United States entered into World War II and the military requested facilities suitable for use as induction and training areas. Kellogg donated three of his homes to this effort. The United States Army used the California horse ranch to establish the Pomona Quartermaster Depot (Remount) as a distribution point for cavalry horses. The Florida home became the Dunedin Marine Base for the training and testing of Roebling amphibian tanks, and the Coast Guard used the Eagle Heights Estate in Michigan, as an induction and training center.

Kellogg increasingly felt that he and his wife were merely "rattling around in houses" and they had no need for such luxury.

Before the military moved into the Manor House, a thorough exit inventory was done and all of the furnishings were moved into storage. As one might imagine, the military made quite a few modifications to the house so that it was more suitable for their purposes including painting rooms an olive drab, that is still evident on some of the tile work.

When the Coast Guard moved onto the Estate in 1942, it began inducting groups of 150 men into service at a time. During that first year, more than 3,000 men passed through the Manor House. As the war ended, military needs shifted from training to rehabilitating wounded soldiers, and the Manor House was used as a rehabilitation center affiliated with the Battle Creek-based Percy Jones Army Hospital (now the Hart-Dole-Inouye Federal Center). The Skinner pipe organ found a new home when Kellogg donated it to the Percy Jones Army Hospital for use in the chapel.

By 1950, the military no longer had a use for the Eagle Heights Estate and it was returned to

Rehabilitating soldiers making use of the dining room in the Kellogg Manor House as a library during WWII.
PHOTO: Hart-Dole-Inouye Federal Center Archives

the W.K. Kellogg Foundation. By this time, Kellogg was 90 years old and had lived the last decade in a more modest house on Gull Lake, not far from his estate. After his death on Oct. 6, 1951, the Foundation donated the Manor House and associated property to Michigan State College. This donation of property to the college formed what was then known as the Kellogg Station which included the Kellogg Bird Sanctuary, Farm and Forest that had been donated to the college in 1927, 1928, and 1931, respectively.

The Manor House was a dormitory for female students during summer sessions through the late 1960s, when apartments and other housing were constructed on the site. From the 1970s through the late 1990s, the Manor House was used for administrative offices and meeting space, which resulted in further modifications to the residence beyond those made when it was in use by the military.

In 1998, the Kellogg Foundation provided Michigan State University with a $3.5 million

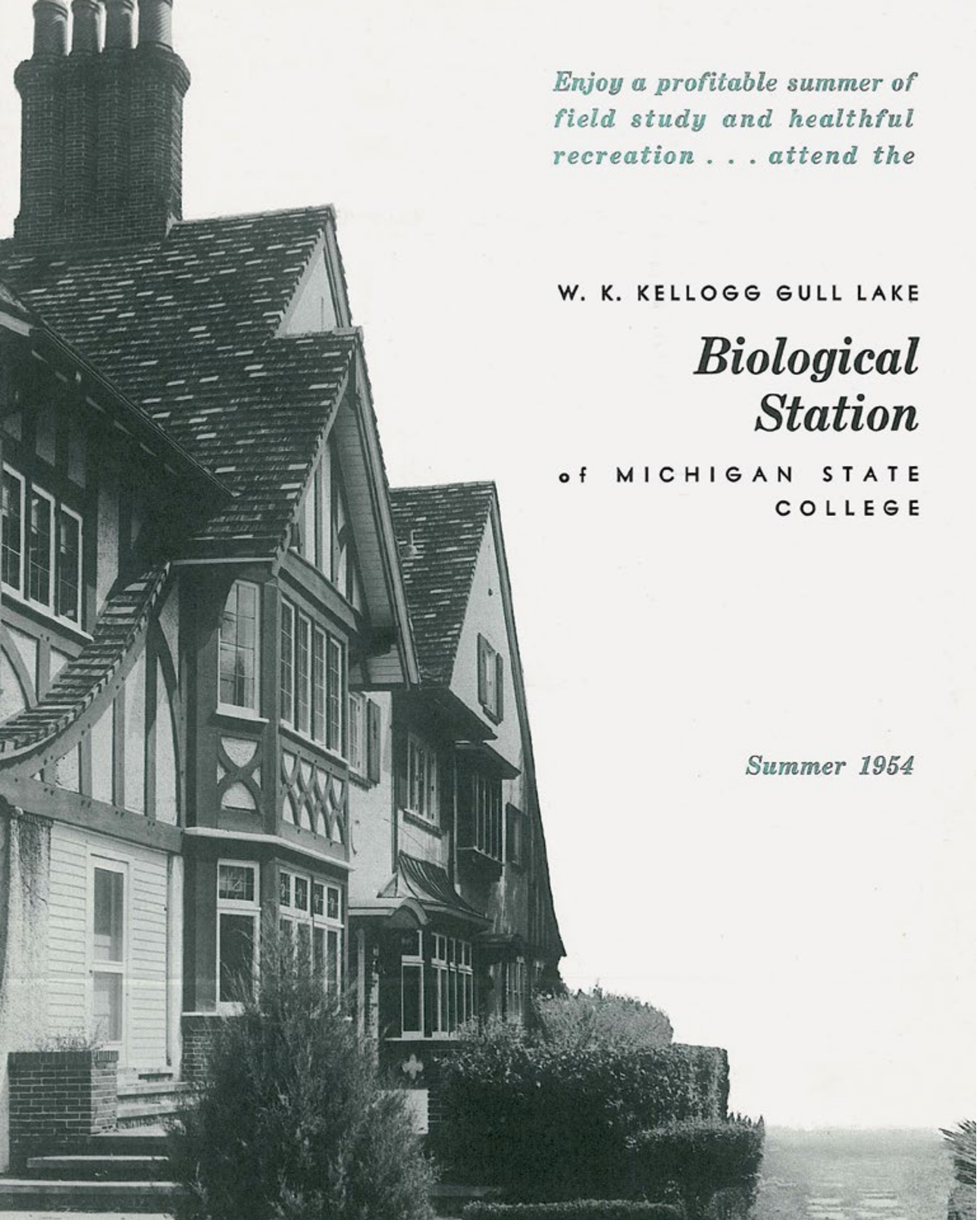


PHOTO TO LEFT: *Brochure for summer courses at the newly formed W.K. Kellogg Gull Lake Biological Station.*
IMAGE: KBS Archives

grant to restore the Manor House to the original appearance and condition it had when used as W.K. Kellogg's summer home.

Supervised by Michael Spezia of Spezia Management, who had also restored the Kellogg House in Battle Creek, the home's functional "upgrades" were reversed as much as possible. Decorative doors were recreated, the screened porches were rebuilt and even the roof tiles were purchased from Rookwood, the company that made the originals in 1926.

Kellogg's attention to detail and recordkeeping during the construction of the house aided the restoration project. In choosing furnishings, Spezia and his team referred to the original Marshall Field and Company invoices that included lists of rugs, furnishings and artwork purchased for the house. They analyzed photographs from Kellogg's time in residence and went over the exit inventory taken prior to the military encampment. Only

The Kellogg Manor House exterior after restoration. PHOTO: KBS

the three tapestries and some of the light fixtures found in the house today are original, the rest were reconstructed based on Kellogg's records.

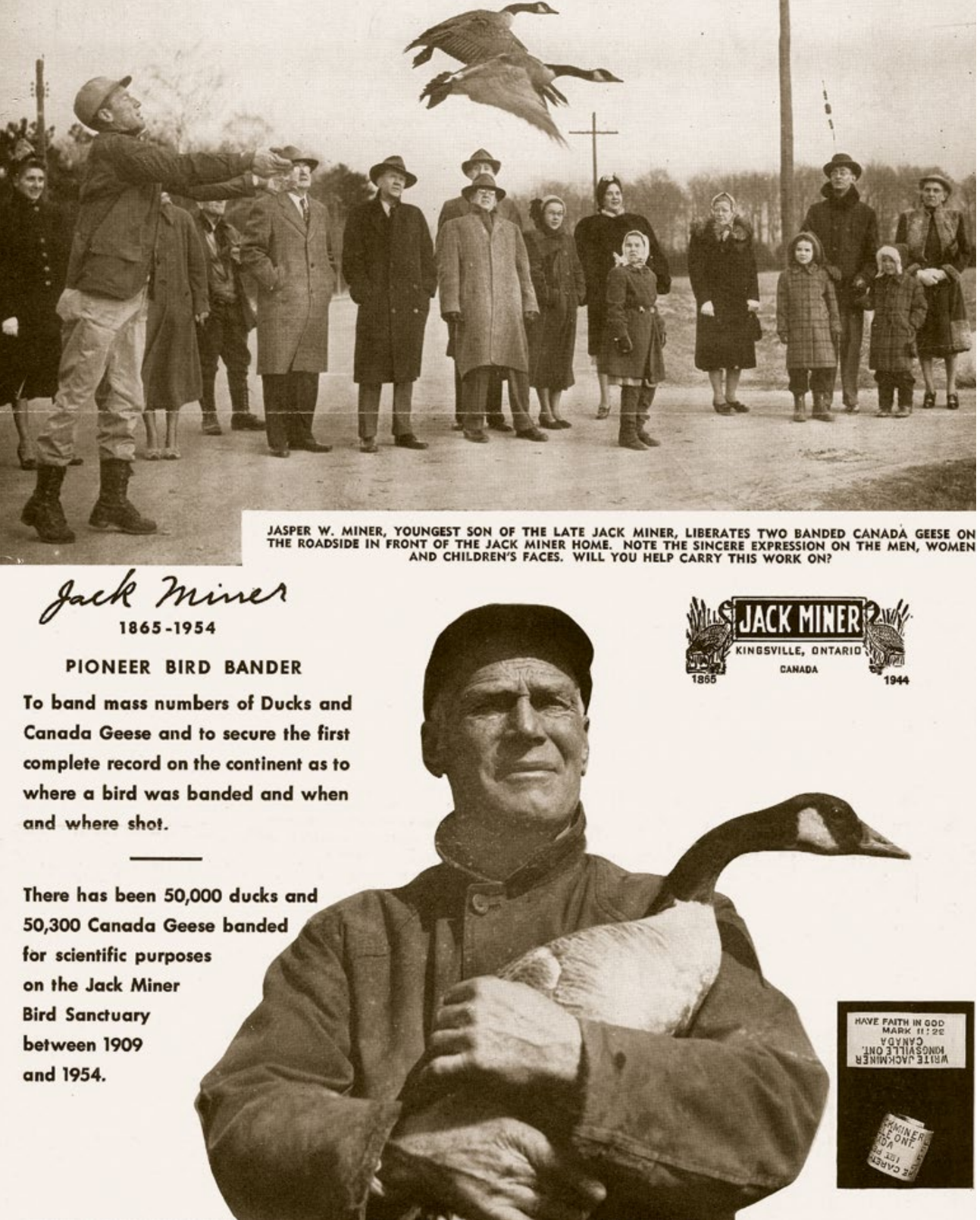
The renovation culminated in a public open house and that began a tradition of having an open house in April every year to celebrate a man who gave so much to the area. Many community members have fond memories of their times on the Estate. Hickory Corners Veterinarian and former MSU student Sally Turner, told the Battle Creek Enquirer, "I would like to take my kids to the open house," and fondly recalled staying in the house when it was a women's dormitory and sneaking down to the kitchen at night for cookies.

Today, the Manor House is open daily for self-guided tours and is used for meetings and special events of all kinds, including weddings. The W.K. Kellogg Biological Station hosts dinners and receptions here to promote discussion among students, faculty, residents and community leaders.

The Kellogg Manor House is a welcoming, public face of the Kellogg Biological Station. Its mission is to share the story of Kellogg's life and philanthropy with guests and visitors, and to promote the research and education programs of the Station today.

One of the tapestries that was part of the original furnishings of the Manor House. The tapestries were made in northern France, with a Flemish motif, in the early 1600s. They were rehung in the house following the restoration. PHOTO: KBS

Volunteer handing out brochures at the 2018 "Sustaining the Vision" open house held every April at the Kellogg Manor House. PHOTO: KBS



Chapter Three

The Bird Sanctuary

In the early 1900s, there were few to no hunting restrictions in place and many wildlife and waterfowl habitats were destroyed by deforestation and draining of wetlands for agricultural and industrial purposes. Native game birds had all but disappeared. As the national conservation movement was beginning in earnest during this time, it is easy to see how W.K. Kellogg's interest in protecting waterfowl may have been piqued when he began construction of his estate on the shore of Gull Lake.

Before construction of the Manor House, Kellogg had already become particularly interested in the work of Canadian bird refuge pioneer, Jack Miner. In 1923, Jack Miner released his first book titled *Jack Miner and the birds, and some things I know about nature.* That same year Kellogg invited Miner to Battle Creek to speak at a conference for Kellogg Company employees. Miner discussed his successful preserve for hunted waterfowl, including the then threatened Canada goose. His talk prompted Kellogg to visit Miner's "Goose Sanctuary", near Kingsville, Ontario, during Spring 1924. Kellogg was interested to see how Miner created habitat that provided food, protected birds from hunters, and offered a safe place for mating and migration. During Kellogg's visit, it was estimated that nearly 6,000 migrating birds were congregated at Miner's sanctuary and the sight moved Kellogg to action.

Almost immediately, his attention turned to creating a sanctuary to protect waterfowl. On Nov. 2, 1926 he wrote a letter to his Battle Creek attorney, Burritt Hamilton, expressing his desire to finance a bird sanctuary near Gull Lake.

Kellogg's friend and lawyer, George McKay, who also lived on Gull Lake, shared his passion for conservation. McKay was the presiding officer of the local chapter of the Izaak Walton League, one of the country's earliest conservation groups. McKay would often attend luncheons and dinner meetings with legislators, league members and Gull Lake residents to gain support for protecting waterfowl and wildlife in the area.

McKay and Kellogg worked together to have Gull Lake designated as a wildlife sanctuary area. Their movement gained momentum through Kellogg's pledge to finance efforts

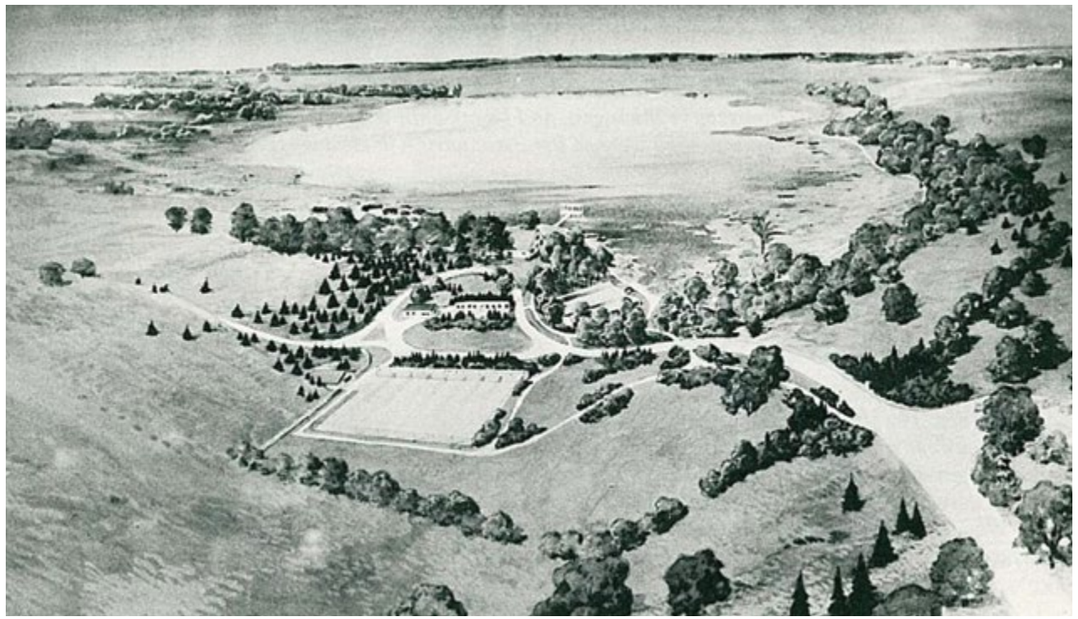
Image of a pamphlet about Jack Miner and his contributions to bird conservation from the Kellogg Bird Sanctuary papers. IMAGE: KBS Archives

both to increase the population of game birds and provide food and habitat to support them during migratory seasons. McKay circulated a letter of support for residents to sign on Kellogg Company letterhead, and spoke with residents about Miner's success with a Canadian bird sanctuary and Kellogg's interest in establishing a similar site near Gull Lake.

As a hunter, McKay could appeal to the interests of other hunters by stating, "If we can secure this protection at Gull Lake, the lakes for miles around are bound to have a great many more birds than they do now. There, our hunting should be better in the surrounding territory which would more than offset the loss of hunting on Gull Lake."

As word got out regarding Kellogg's bird conservation, George Corsan wrote Kellogg a letter, in November 1926, that stated, "I understand that you are undertaking a very large bird sanctuary on Gull Lake at Battle Creek and are looking for a manager or supervisor of the place." Corsan had several years of experience working with game birds in Islington, Ontario, and felt he would be of "great assistance" to Kellogg and his "excellent idea of a bird sanctuary." Kellogg remembered Corsan as the man who had given him swimming lessons and spoken at the Battle Creek Sanitarium

Aerial sketch of the proposed Kellogg Bird Sanctuary on Wintergreen Lake. IMAGE: KBS Archives



GULL LAKE SANCTUARY

ACT 368 P. A. 1927

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

GULL LAKE, PROHIBITED HUNTING, TRESPASS PROPERTY. Section 1. It shall be unlawful for any person to chase, molest, catch, injure, destroy or kill any wild waterfowl, wild shore bird, wild game birds or any other birds, or any wild animals except rabbits, during the open season thereon, within, upon or above the waters of Gull Lake in either the county of Barry or the county of Kalamazoo in this state, or upon or about the territory within 80 rods from the nearest shore line of said lake in either of said counties: Provided, That this act shall not in any way operate to exempt from hunting any otherwise huntable property within the territorial limits herein described. Am. 1921, Act 192.

PENALTY. Section 2. Any person violating any of the provisions of this act shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof, be subject to a fine of not more than $100.00 or imprisonment in the county jail for a period of not more than 90 days, or by both such fine and imprisonment in the discretion of the court.

The Gull Lake Sanctuary Act passed by the Michigan Legislature in 1927 that designated Gull Lake and the surrounding landscape out to a distance of "80 rods" (1/4 mile) of the shoreline as a bird and wildlife sanctuary. IMAGE: KBS Archives

several years prior, and invited Corsan to visit the proposed sites during Winter 1927.

Corsan met with McKay in January 1927, while Kellogg was in California for the winter, to interview for the Sanctuary Manager position and to look at the properties that McKay and Kellogg thought would be well suited for a breeding bird sanctuary. Both McKay and Corsan believed that Wintergreen Lake, a small lake near the southeastern shore of Gull Lake, would work well. Shortly after the visit, McKay wrote a letter to Kellogg describing Corsan as a man who, "understands the propagation and care for wild birds. He is also very well versed on tree life."

Shortly after receiving McKay's summary of the visit, Kellogg urged Corsan to send him a proposal for a sanctuary, upon which they agreed. Kellogg offered Corsan the job of Sanctuary Manager, with a $5,000 annual salary and a furnished on-site cottage for he and his wife. Corsan began his employment in April 1927.

Following Corsan's arrival in April, McKay and Kellogg's work in the surrounding community resulted in legislation, the "Gull Lake Sanctuary Act 368 of 1927," which declared Gull Lake and the land within 1320 feet of the shoreline a wildlife sanctuary that protected waterfowl, shore birds, game birds, and "any other birds or wildlife except rabbits" from hunting.

Wintergreen Lake, a 40-acre lake that was within a half mile of Gull Lake, was considered the preferred site for the sanctuary. Kellogg purchased the properties needed for his bird sanctuary, and within six months of McKay and Corsan's recommendation, Kellogg had bought the land and ponds surrounding Wintergreen Lake, enclosed 180 acres with chain link fence, and developed what we now know as the W.K. Kellogg Bird Sanctuary.

Kellogg solidified his commitment to the Sanctuary in November 1927 by establishing a trust for financing the Sanctuary Manager position. The documents even went so far as to insist that the trust administrator ensure that there was always cooperation with the Michigan State Board of Agriculture and Natural Resources. Little did anyone know at the time, but Wintergreen Lake was optimally suited for a sanctuary as it is located along a major migration route now known as the Mississippi Flyway.

Not everyone in the community was supportive of Kellogg's aspirations. One local businessman

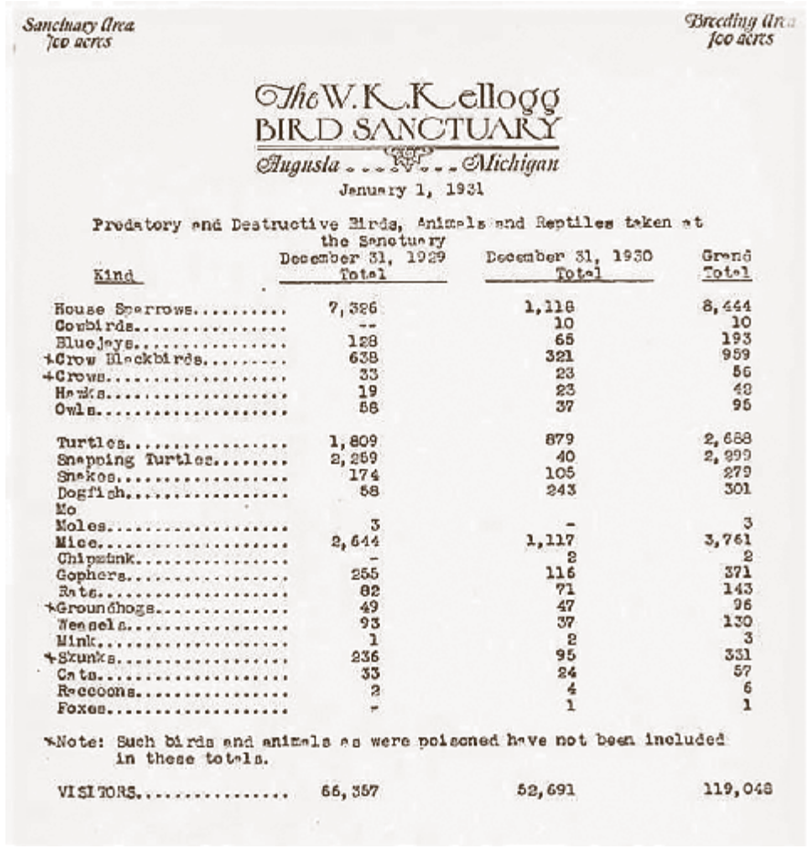
The entry sign for the Kellogg Bird Sanctuary in the 1930s. PHOTO: KBS Archives

joked, "I'm going to take my gun over to your bird preserve and do some hunting." To Kellogg, conservation was no joking matter, and he refused to engage in mocking it, so he firmly retorted, "If I ever catch you in my preserve shooting any of the birds, I will prosecute you to the fullest extent of the law."

Local residents were hired to help build bird pens, shelters, a garage and an office. Kellogg relied completely on his experts, Corsan and Miner, to design and implement plans for the Sanctuary. As the new manager, Corsan's ideas and experiments dominated the early development of the Sanctuary. He was a vegetarian and exercise enthusiast and worked diligently alone, some days until dark. Corsan's passion for game birds was evident in his almost daily correspondence to Kellogg regarding "varmints." He wrote about the predators, including birds of prey, that he believed needed to be removed from the property. He also wrote to Kellogg about game bird purchases and care requirements for their breeding success.

Corsan established predator traps to protect his birds. He disposed of snakes, raccoons, foxes, cats, opossums and coyotes. He even eradicated large owls that posed a threat to his young flocks. Corsan understood the breeding and establishment of the birds, yet like many during this time, lacked understanding of how different species contribute to a balanced ecosystem.

In 1928, Corsan announced that he had the only nesting blue geese south of Canada, and obtained the Canada goose from Miner to develop a decoy flock at the Kellogg Sanctuary. Corsan also purchased trumpeter swans from Holland and black swans from Australia to be housed at the Sanctuary. His focus was on bird-watching enjoyment and beautification of the landscape.



Sanctuary Area 700 acres — Breeding Area 500 acres

The W. K. Kellogg
BIRD SANCTUARY
Augusta ... Michigan

January 1, 1931

Predatory and Destructive Birds, Animals and Reptiles taken at the Sanctuary

Kind	December 31, 1929 Total	December 31, 1930 Total	Grand Total
House Sparrows	7,326	1,118	8,444
Cowbirds	--	10	10
Bluejays	128	65	193
*Crow Blackbirds	638	321	959
*Crows	33	23	56
Hawks	19	23	42
Owls	58	37	95
Turtles	1,809	879	2,688
Snapping Turtles	2,359	40	2,399
Snakes	174	105	279
Dogfish	58	243	301
Mo			
Moles	3	-	3
Mice	2,644	1,117	3,761
Chipmunk	-	2	2
Gophers	255	116	371
Rats	82	71	143
*Groundhogs	49	47	96
Weasels	93	37	130
Mink	1	2	3
*Skunks	236	95	331
Cats	33	24	57
Raccoons	2	4	6
Foxes	-	1	1

*Note: Such birds and animals as were poisoned have not been included in these totals.

VISITORS	66,357	52,691	119,048

The "vermin" and visitor tally sheet from December 1929 and December 1930. George Corsan, the first Sanctuary Manager, worked to eliminate what he thought of as threats to the health and safety of birds at the Sanctuary. IMAGE: KBS Archives

Kellogg's vision for the Sanctuary was that it would also serve as an educational center for animal care and management, and he "hoped that Wintergreen Lake would be used as a training school to qualify people to take up similar work in other places." In December 1928, he deeded the Sanctuary to the Michigan State College of Agriculture and Applied Science (MSC, now Michigan State University) to encourage educational programs at the Sanctuary.

In 1930, Corsan and Kellogg welcomed C.J. Henry and Homer Bradley to Wintergreen Lake

as the first two students to work and study at the Kellogg Bird Sanctuary. With the focus of the Sanctuary expanding from population establishment and conservation to include education and research, Corsan no longer seemed the best choice as Sanctuary Manager and a search for a new manager ensued.

Dr. Miles Pirnie was appointed as the Kellogg Bird Sanctuary Manager in 1931. Pirnie had previously served as Michigan's first game division ornithologist when the state formed one of the nation's first state conservation departments in 1921. Pirnie had more of a traditional academic focus than Corsan. This, along with Pirnie's faculty status, better suited the Sanctuary's transition to being part of MSC. Though Pirnie and Corsan differed in their approaches, they shared a passion for birds.

Dr. Miles Pirnie, Sanctuary Manager from 1931 to 1948. PHOTO: KBS Archives

For Corsan, the idea of the natural balance and allowing predators to attack and kill the game birds seemed counterintuitive. For Pirnie, there was a balance to be struck, and his education helped him understand the value of each species in a healthy, functioning ecosystem, although mechanisms behind this were just beginning to be understood. Research was needed regarding the diseases, feeding habits and migration patterns of almost every Michigan bird and animal.

Nuts for Trees

CORSAN ALSO HAD A PASSION FOR NUT TREES. When addressing the Northern Nut Growers Association in 1934, Kellogg reminisced that as a child his father, "took the children nutting." Those evenings they gathered around the kerosene lamp where his father inverted a flat iron from the stove to set in his lap and examine the hickory nuts from their excursion. Kellogg explained how his new Sanctuary Manager also rekindled his intrigue for nutting. "Mr. Corsan became associated with the Bird Sanctuary ... and very shortly thereafter was talking nut culture," stated Kellogg. "The result was we began to order nut trees by the carloads."

Corsan tended to the trees with pride and spoke of carrying water to each of "my nut trees" every morning. During the four years that Corsan managed the Sanctuary he connected Kellogg to J.A. Neilson, a horticulture professor at the Ontario College of Agriculture in Guelph and a fellow nut enthusiast. Corsan planted walnut, chestnut, and pecan trees along with more than 4,000 pine and spruce trees on the sanctuary grounds, many of which can still be found there.

Dr. Miles Pirnie with an unknown student netting ducks on Wintergreen Lake in the 1930s. PHOTO: KBS Archives

Pirnie felt that the Sanctuary could contribute to the development of this knowledge through applied research and education.

One of Pirnie's first efforts was a collaboration between the newly designated Sanctuary committee and several MSC professors to participate in the Kellogg Summer School of Biology that started in 1931. The Summer School of Biology was dedicated to providing field education in biology to MSC students studying to become biology teachers.

Pirnie also differed from Corsan in his willingness to allow public access within the Sanctuary.

Sanctuary visitors enjoying the view and the birds from the shore of Wintergreen Lake in the 1930s. PHOTO: KBS Archives

Corsan wanted to restrict the public to certain viewing areas at certain times, whereas Pirnie encouraged the public to visit by extending visiting hours and opening additional areas on the grounds to visitors.

Arguably, Pirnie's largest contribution to conservation efforts at the Sanctuary was his work in tracking and understanding game bird populations. He established the Sanctuary's waterfowl leg-banding program in collaboration with the U.S. Department of Agriculture's Bureau of Biological Survey. The fairly new technique provided important information regarding migratory patterns of birds.

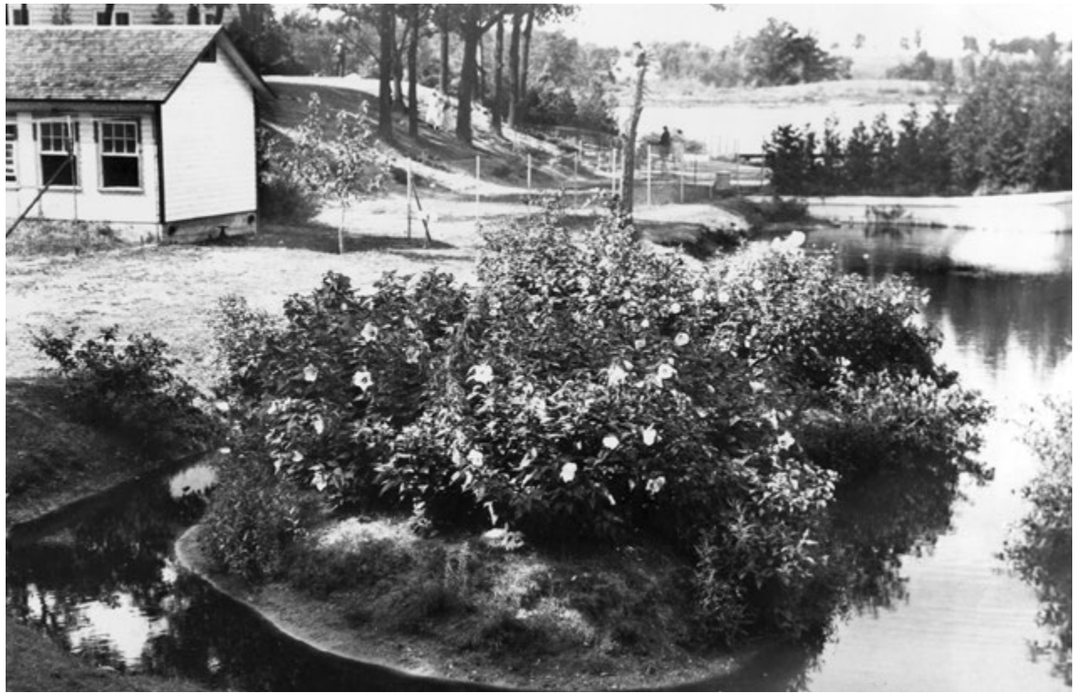
Pirnie also formed a long-term relationship with the Institute for Fisheries Research, established by the University of Michigan, Board of Regents in 1930. In May 1935, a baseline collection of fish species in Wintergreen Lake was conducted. Pirnie's staff and Institute researchers investigated fish growth patterns, what they ate, and predator-prey interactions between species. This established a baseline of data that could be used for both immediate and long-term research. Pirnie allowed game fishing in Wintergreen Lake, provided that each angler submit his or her catch to the Sanctuary staff to document any tags, weigh, measure, take scale samples and remove the fish stomachs for study.

At this same time, waterfowl research led by Dr. E.C. O'Rorke, a University of Michigan pathologist, resulted in the discovery of a new duck parasite. This prompted cooperative studies between the MSC, the Michigan Department of Conservation and U.S. Biological Survey to collect data on parasites in waterfowl and game bird species.

Pirnie also established the first graduate assistantships at the Sanctuary in 1932. Michigan State College funded the assistantships to support graduate student projects involving practical research in wildlife management. The Great Depression took a toll on the Sanctuary's operational budget. Pirnie took two voluntary pay cuts himself and laid off two full-time employees during the harshest of times. By employing students, the Sanctuary was able to advance the college's research and ease its budgetary constraints by filling two full-time staff positions with two half-time graduate assistants.

Prior to WWII, graduate students also helped Pirnie expand the Sanctuary's public education

Graduate students reading a leg band on waterfowl captured at the Kellogg Bird Sanctuary in the late 1930s. PHOTO: KBS Archives



Demonstration area for waterfowl nesting and loafing islands in the 1940s. PHOTO: KBS Archives

program that encouraged the appreciation and support of wildlife. Visitors marveled at the beauty of the exotic birds, and learned to appreciate the value and beauty of purposeful ground plantings. Through demonstrations, the Sanctuary showed landowners how to apply these strategies to their own properties with the intention of supporting native wildlife.

The progress made in habitat management led to the successful re-establishment of breeding populations of many species. Nesting songbirds were among the most evident of these. In addition, a northern breed of wild turkey was developed to aid the Department of Conservation with its restocking program. The Sanctuary mainly focused on waterfowl and this led to increased nesting populations of mallards and wood ducks. European whooper swans at the Sanctuary were the only breeding flock in North America.

The Sanctuary's largest breeding success remains evident today. It is hard to believe,

Roswell Van Deusen, Sanctuary Manager from 1955 to 1985, with Dr. Durward Allen, a former graduate student at the Sanctuary. Allen, then on the faculty of Purdue University, was meeting with Van Deusen to plan a student field trip to the Sanctuary in the late-1950s. PHOTO: KBS Archives

but the Canada goose was once hunted to near extinction and made a successful comeback thanks in part to efforts at the Sanctuary. Pirnie, by allowing the offspring of Corsan's original decoy flock to be "free-flyers," attracted wild Canada goose and soon the species was on its way to a recovery.

Graduate students also made valuable contributions both to the Sanctuary and their fields of study. One of Pirnie's most well-known students was Dr. Durward Allen, who earned his Ph.D. in 1937 studying vertebrates that inhabited farmlands in southern Michigan. Allen went on to an illustrious career as a wildlife biologist, that included developing long-term studies of wolves and moose on Isle Royale, Michigan.

The Sanctuary's educational programs slowed significantly during WWII. Pirnie no longer had the funds or time to travel to give seminars and lectures. Graduate students were no longer available and Sanctuary visitation numbers dropped. But the Custer Military Reserve near Battle Creek provided Pirnie with German prisoners of war as a much-needed labor force to maintain the grounds and buildings.

During this time Pirnie pursued his passion for photography and took advantage of the invention of Kodachrome film to create slides for educational programs. In his 1942 annual report he stated, "in view of restricted travel it seems wise to concentrate all possible effort on the educational program." He got around his travel restrictions by loaning his slide curriculum to interested groups. Slide collections titled, "Attracting Birds," "Local Wildlife", and "Common Birds of the Kellogg Sanctuary" provided visuals and written descriptions that detailed Sanctuary waterfowl, mammals and habitat management. During this wartime lull, the landscape around the Sanctuary grew increasingly beautiful, thanks to the good growing conditions and the maturation of many trees and shrubs.

A post-war economic boom, coupled with pro-conservation legislation, resulted in many positive changes for the Sanctuary, including

increased funding due to growing public interest in conservation. The post-war expansion of MSC included a new Conservation Institute, and as part of this, the college combined the Kellogg Farm, the Kellogg Bird Sanctuary and the Kellogg Forest into one unit, renamed the W.K. Kellogg Station. Administration of the Station fell within the jurisdiction of the college's Conservation Institute instead of the MSC Department of Agriculture, where it had been during the war years. There were also physical improvements to the Sanctuary, as Kellogg donated funds for the construction of a large 2-story cabin using stone and lumber collected and harvested on-site. This building, now known as Spruce Lodge, still stands along the Lake Loop hiking trail.

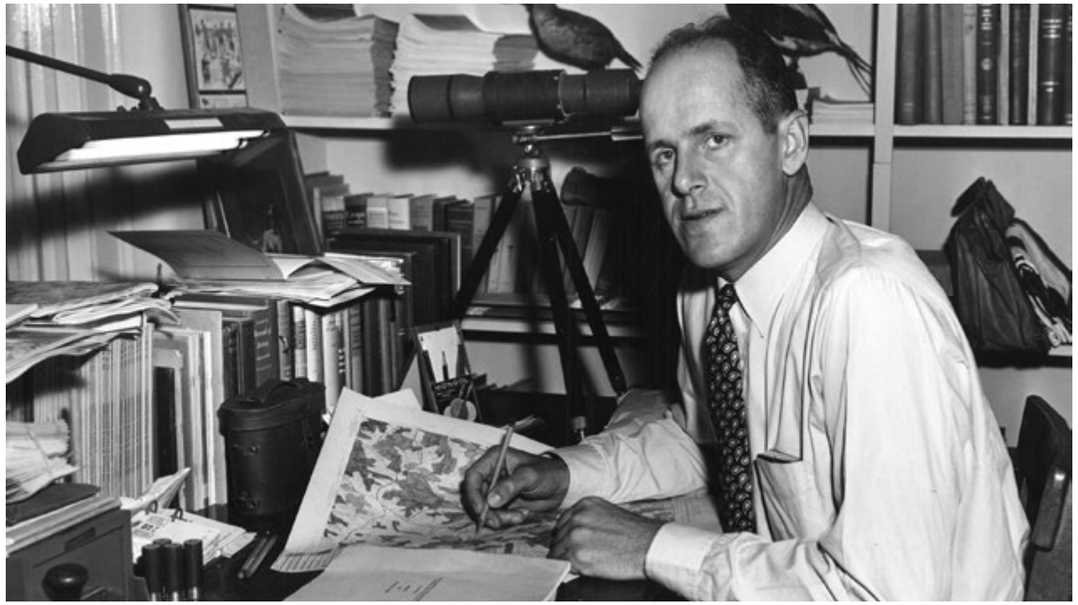
Dr. Arthur Staebler, manager of the Sanctuary from 1948 to 1954. PHOTO: KBS Archives

In 1948, Pirnie left the Sanctuary for a position as a full professor at MSC so that he could devote more time to research, and Dr. Arthur Staebler became the Sanctuary's third manager. Staebler worked closely with Pirnie and others from the East Lansing campus to complete upgrades and needed repair work at the Sanctuary. He restocked viewing pens that had been emptied during the Depression, sold the ornamental pheasants, introduced quail, grouse and game pheasants, and enhanced the lakeside viewing areas.

Staebler believed that bird banding would lead to a greater understanding of bird migration and survival. He used a specially designed trap to capture and band migrant Canada goose and he established one of the first long-term data sets on migratory birds at the Sanctuary. Staebler began banding demonstrations and with the development of new trapping techniques, including a net cannon, he tripled the number of birds banded at the Sanctuary. Staebler also innovated a wing clip banding technique, borrowed from poultry breeders and adapted for his purposes, that bird banders still use today.

With Kellogg's passing in 1951, the W.K. Kellogg Foundation (WKKF) donated the Manor House, the Estate, its grounds and buildings to MSC. This donation expanded the opportunities for graduate students and the Summer School of Biology by providing facilities that could accommodate groups of students and faculty wanting to stay on-site. As a result, research done at the Sanctuary expanded and grew to include many areas of biology, not just ornithology and wildlife studies. These efforts were facilitated by the establishment of Kellogg Sanctuary Fellowships that expanded research on waterfowl nesting and fish population dynamics.

In 1954, Staebler left the Sanctuary and MSC for a faculty position at Fresno State College (now Cal State–Fresno). MSC graduate Roswell D. Van Deusen was hired to replace him as



Roswell Van Deusen shortly after he was hired as the Kellogg Bird Sanctuary Manager. Van Deusen was the longest serving manager of the Sanctuary to date (1955 – 1985). He and his family lived on site in a house that is now used by graduate students and visiting researchers. PHOTO: KBS Archives

the Sanctuary Manager and wildlife biologist in January 1955. That same year, MSC became Michigan State University (MSU), and as part of a reorganization the Sanctuary became part of the university's new Department of Fisheries and Wildlife. As part of this, faculty in Fisheries and Wildlife assumed a greater role in supervising research, and Van Deusen was charged with administering the facility and increasing public educational outreach.

Van Deusen's skills complemented the Sanctuary goals well. His experience in applied research, comfort with public relations and broad community awareness and education, supported the university's objective to expand educational activities on all levels. He quickly established a rapport with local clubs and organizations, hosted scout leader training programs and provided outdoor instruction for 4-H and school biology clubs. In 1957, the Sanctuary developed an outdoor summer day camp for children that continued for over 60 years. Van Deusen also enlisted enthusiastic volunteers to help him set up new displays and maintain the Sanctuary museum, assist with grounds work, and even guide tours of the Sanctuary.

During the early years of Van Deusen's tenure, a collaboration between the Sanctuary and the Soil Conservation Service encouraged farmers to build and maintain waterfowl nesting islands in ponds. They also established demonstration run-off plots near the entrance to the Sanctuary. This work prompted the Michigan Agricultural Stabilization Committee to include constructed nesting islands in its official criteria for proper pond construction and management. As a result, local landowners cleared land for goose pastures and constructed nesting islands across southwestern Michigan. The Sanctuary provided the Canada goose to assist in restocking efforts throughout the state. Van Deusen organized volunteers and applied population fostering techniques for the Canada goose within the Sanctuary grounds. As a result of these efforts, the population of the Canada goose increased throughout the 1960s.

During the 1940s, the Sanctuary collaborated with the Kellogg Farm and local conservation districts to establish a display demonstrating how different crops and management systems could reduce soil run-off and erosion. PHOTO: KBS Archives

Research done at the Sanctuary has also had a large influence on our knowledge regarding Canada goose migration. For his Ph.D., Ward Rudersdorf completed the first assessment of migratory patterns of the Canada goose flock at the Sanctuary. Ruserdorf's study showed that the Canada goose migrating over Michigan generally come from a single nesting area west of James Bay in Canada, travel south in the fall and stopped at the Sanctuary on their way to overwintering grounds in southern Illinois, Indiana, Ohio, Kentucky and the Tennessee Valley region.

Van Deusen assisted a number of graduate students with research that was valuable to the Sanctuary such as the nesting and food habits of long-eared owls (W.H. Armstrong), controls on reproduction of the Canada goose (J.S. Woods), and the role of waterfowl in the dispersal of algae (H.E. Schlichting). Several studies on the importance of outdoor education for student learning were also done at the Sanctuary during this time. The growing use of the Sanctuary for research and educational programs was important for obtaining a grant from the WKKF in the early 1960s for a facilities upgrade at

the Sanctuary. Also in 1961, the administration of the Sanctuary shifted from the Department of Fisheries and Wildlife at MSU to the Kellogg Biological Station.

Visitation to the Sanctuary also grew during this time, and by 1963, annual visitation exceeded 200,000. Recognizing the associated opportunities and responsibilities, Van Deusen created a new Sanctuary staff position for an interpretive ecologist. This position was responsible for educational activities, including credit and non-credit courses and the development of supplementary teaching aids.

At the same time, Wilbur C. "Joe" Johnson, was hired as a wildlife biologist at the Sanctuary and was responsible for its aviary and served as a liaison with faculty at the Gull Lake Laboratories. Johnson had a long history at the Sanctuary, having worked there as a high school student and doing research for his MS (1967) at MSU using the Sanctuary Canada goose population. He also had strong connections to the community and was often called on for his expertise in wildlife biology by the public and researchers from MSU.

Robert F. Mainone, specialist in environmental education, was hired to develop summer

Tour for elementary school children in the mid-1970s. PHOTO: KBS Archives

teacher training courses for teachers who designed and tested innovative programs and materials in the children's day camp program. A junior counselor volunteer program for young people was also developed. The Gull Lake Environmental Education Project developed at the Sanctuary was the outlet for published workshop materials, supplementary teaching aids, slide sets and packets.

The Sanctuary offered its first series of adult education classes in Spring 1972. These non-credit field courses demonstrated the interdisciplinary nature of environmental studies and included forest ecology, water life, ornithology, anthropology, edible wild plants, environmental philosophy, cross-country skiing and photography.

With growing public interest in the urban environment, backyard ecology became a theme for Sanctuary programs throughout Van Deusen's leadership. He developed several demonstration areas at the Sanctuary where the public could see the effects of plantings for wildlife and their aesthetic appeal in various stages of growth. Native oaks and hickory trees that survived grazing, together with nut trees (pecans, walnuts and chestnuts) and evergreens complemented introduced varieties like the zumi crab and fragrant sumac. More than 30 species of trees and dozens of grasses, shrubs and vines helped make the Sanctuary both a wildlife haven and an excellent resource center for environmental education.

With Van Deusen's retirement in 1985, Johnson was appointed to both chief wildlife biologist and Sanctuary Manager. Already entrenched in the Sanctuary's daily life, Johnson made a seamless leadership transition. He had been active in community and professional organizations and continued to foster the relationship between the public and the Sanctuary. He made presentations to all age groups and education levels in the community on wildlife, habitat preservation and species restoration.

Joe Johnson, Chief Wildlife Biologist and Bird Sanctuary Manager (1985–2007) developed exceptional relationships with community members who honored his service to MSU and KBS by establishing an endowed scholarship in his name. PHOTO: KBS

Shortly after Johnson's appointment, the Kellogg Bird Sanctuary joined efforts to re-establish the native trumpeter swan in Michigan and the upper Midwest. In the late 1800s, trumpeter swans were hunted for their feathers that were used extensively by the fashion industry. The heavy, unrestricted harvest of these birds drove them nearly extinct.

Johnson worked with the Michigan Department of Natural Resources and U.S. Fish and Wildlife Service on the Trumpeter Swan Restoration Project. The goal was to have 200 trumpeter swans nesting in the state of Michigan by the year 2000.

Early repopulation efforts involved fostering trumpeter swan cygnets under feral mute swans. Unfortunately, foster parent abandonment and predation limited the success of these efforts. A change in strategy involving relocating eggs gave Johnson the chance to pursue adventure and his success secured his legacy.

Johnson traveled to Alaska to collect wild trumpeter swan eggs and also obtained stock from zoos. He brought 92 Alaskan trumpeter eggs with live embryos back to the Sanctuary, where the swans hatched and matured for two years while Sanctuary staff fostered them. In 1992, the first trumpeter swans in more than a century were hatched in Michigan, and in 1999, the program reached its goal of having 200 free-flying trumpeters in Michigan — one year ahead of the established goal. Trumpeter swans are an increasingly frequent sight on Michigan's inland lakes.

Joe Johnson holding the wing of an immature trumpeter swan in the late 1990s. PHOTO: KBS

Sanctuary staff continued banding waterfowl into the 1990s and experimented with different types of banding. Each year they would band 300 to 400 ducks and a large number of Canada goose and then record what birds returned and from where.

Neck collars and bands colored according to location provided scientists important data pertaining to species survival, longevity and dispersal statistics. Sanctuary staff experimented with color markers and banding modifications for waterfowl. Rubberized neck collars prevented problematic ice buildup during poor weather conditions. This research contributed valuable information on fall distribution and migration of the Canada goose and other waterfowl.

The Sanctuary in partnership with MSU Extension offered a number of community programs in the 1990s. The success of these programs was in large part due to a growing and vibrant KBS volunteer program. Volunteers remain an integral part of the Sanctuary and assist with everything from hosting summer children's camps to monitoring nesting boxes, managing the store and assisting with captive bird care.

Sanctuary volunteers and staff working with Michigan Department of Natural Resources staff to release rescued birds following the 2010 Enbridge Oil spill on the Kalamazoo River. PHOTO: KBS

Johnson retired in 2007 and to honor his distinguished, nearly 50-year career at the Kellogg Bird Sanctuary, KBS established The Joe Johnson Endowment for Wildlife Conservation Fellowships fund. Community members, friends, and KBS faculty and staff helped fund this fellowship that is awarded to undergraduate student interns to study wildlife and habitat conservation or restoration.

With Johnson's retirement, KBS created a new position of Environmental Education Coordinator to oversee the Sanctuary. Tracey L. Kast held this new position for two years and expanded programing to include short courses in ornithology that continue today. In October 2009, Kara L. Haas, was hired to this position and worked with KBS faculty to expand outreach and eduction programs for K-12 teachers as well as the public to strengthen community ties.

On July 26, 2010, Canada-based Enbridge Inc. detected a leak in a 30-inch pipeline. The resulting oil spill traveled into Talmadge Creek in neighboring Calhoun County, which flows into the Kalamazoo River. Sanctuary staff aided relief efforts, and community members donated supplies and assisted with clean-up. Many of the Canada goose and mallard ducks

Current map of the W.K. Kellogg Bird Sanctuary and grounds showing trails throughout the property. IMAGE: KBS

that were caught in the spill were returned to the wild after having been rehabilitated at the Kellogg Bird Sanctuary.

In 2011, Haas reached out to the community for input into developing a new strategic plan for the Sanctuary. She worked with staff and volunteers to understand what the community wanted from the Sanctuary and distributed a survey to visitors to get input from them.

The strategic plan called for a focus on improving the facility and grounds to enhance education and accessibility. A successful fundraising campaign culminated in construction of a wheelchair-accessible and foot-traffic friendly Thomas E. Dvorak Memorial Bridge, dedicated in October

Kara Haas (right), Sanctuary Environmental Education Coordinator (2009 – 2014), leading tour on the new Bluebird Trail at the Sanctuary in 2013. PHOTO: KBS

In 1992, the first trumpeter swans in more than a century were hatched in Michigan, and in 1999, the program reached its goal of having 200 free-flying trumpeters in Michigan.

2011, along the popular lake-front trail. Local business contributions supported trail sign improvements and in May 2012, the Sanctuary opened the new 1.5-mile Lake Loop Trail. Visitors can now walk around Wintergreen Lake to explore the variety of forest and shoreline habitats surrounding the lake.

The Sanctuary staff also evaluated the number of captive birds and the types and species of birds on display to the public to determine how they could best support educational programs. The Sanctuary focused on Michigan native species, with the exception of a few exotics that were kept to reflect its history. This new focus helped staff members educate visitors about

Michigan's native species and how to attract them to their own backyards.

Exotic birds like the Australian black swans have been a part of the Sanctuary since the early W.K. Kellogg years. They help tell the story of the Sanctuary's roots and the original connection with Kellogg. Chinese pheasants were originally donated by Grand Rapids entrepreneur, Leslie E. Tassell, along with the upland game bird display named for him. These birds aid Sanctuary educational efforts focused on demonstrating adaptations to different habitats and comparing non-native to native Michigan game birds like ruffed grouse and bobwhite quail.

Haas created collaborative relationships to strengthen the captive bird programming and improve bird care. She reached out to the MSU School of Veterinary Medicine and connected with local veterinarians, many of whom were MSU alumni, to help with emergency care of captive birds. These community partners

Current Sanctuary Manager, Lisa Duke, with a great horned owl trained to assist with educational programs. PHOTO: KBS

helped create standard operating procedures and care plans for the captive and migratory birds. Investments in an upgraded aeration system provided open water for captive birds in the winter and helped to provide clearer water in the summer. Fencing that lined the paths along Wintergreen Lake shore was also replaced. Local volunteers and MSU campus-based groups, such as the Fish and Wildlife Club, did their part to increase the captive bird quality care by cleaning up and renovating enclosures.

Educational and outreach opportunities at the Sanctuary continue to thrive today with leadership of the current Sanctuary Manager, and MSU Fish and Wildlife alumna, Lisa Duke. Programming for youth and adults has grown, and the

The Bird Sanctuary continues the legacy and vision of Kellogg to … provide a place for public and scientific community engagement …

partnership with local schools continues in collaboration with the K-12 Partnership. There is a growing focus on native plants and pollinators — birds, butterflies and bees. Renovations to the entrance of the Sanctuary, completed in 2018, included both native gardens and accessible pathways. The Sanctuary staff focuses on helping the public develop a deeper understanding of native and backyard habitats and how each person can make a difference at home and in the schoolyard.

The Bird Sanctuary continues the legacy and vision of Kellogg to improve waterfowl care and management, and provide a place for public and scientific community engagement, by providing a place for the public to learn about habitats and species that are part of Michigan's natural resources.

Rain garden outside the bookstore completed in 2012 as part of an effort to establish gardens with native plants and add more accessible pathways at the entrance to the Sanctuary. PHOTO: KBS

Chapter Four

The Farm

Kellogg purchased several farms, to acquire the highest point on Gull Lake to build his summer home, and all of Wintergreen Lake, to establish the Bird Sanctuary. Once these projects were completed, he still had an additional 750 acres of what was largely considered degraded agricultural land.

Why was so much agricultural land available for purchase during the mid-1920s?

Land in agricultural production had increased during World War I as a result of high commodity prices, thanks to strong European trade markets. Following WWI, three factors combined to drive down prices for U.S. agricultural products and set the stage for an agricultural land sell-off.

The first was that the process to make cheap inorganic nitrogen fertilizer was developed and fertilizer companies began producing and marketing these fertilizers at home and abroad. At the same time, European farmers were ramping up post-war agricultural production and could largely meet European market demands by the early 1920s. Finally, U.S. trade policies discouraged European product imports, which led to backlash in Europe against U.S. agricultural products, further driving down prices.

Aerial photo of the original Kellogg Farm buildings on 40th Street south of B Avenue in the late-1940s. PHOTO: KBS Archives

Most of the land Kellogg purchased to construct the Manor House and Sanctuary had been cultivated for more than 70 years and had lost a considerable amount of topsoil and soil nutrients. In the mid 1920s, local farmers commonly reported wheat harvests of 14 to 17 bushels per acre, which was lower than the state average of 21.5 bushels per acre. Kellogg believed that the welfare of the nation hinged upon the well-being of the farmer and his land, and used the acreage not incorporated into the Sanctuary or Manor House grounds to create what was called the Kellogg Demonstration Farm. He wanted it to be a working farm that offered an example of how to bring, "worn out or depleted farm soils" back into economically viable production using the most modern and sustainable agricultural methods of the time.

George A. Getman was hired in early 1928 as the first Kellogg Demonstration Farm Manager. Getman graduated from Michigan State College (MSC) in 1920 and spent seven years working as

an instructor and field superintendent at MSC's Agriculture Experiment Station in East Lansing before accepting the position as Kellogg Farm Manager. Getman worked with Kellogg to purchase livestock, including a herd of Guernsey dairy cows, Belgian horses, Poland China hogs, Shropshire sheep and Barred Rock chickens. Additionally, Getman purchased farm and office equipment, office furniture and supplies for the Farm boarding house. He also oversaw the construction of a model dairy barn, horse and sheep barns, a seed house, granary and an office building.

In August 1928, Kellogg hosted a formal dedication for the Farm and invited the public, dignitaries from MSC, and the press. Joseph F. Cox, MSC's Dean of Agriculture, attended the festivities and foreshadowed the eventual gift of the Farm to MSC by telling a reporter that MSC and the Farm would partner to provide

MODEL FARM DEDICATED TO STATE'S US

Kellogg Gift Designed To Raise Standard of Michigan Agriculture

W. K. KELLOGG, WHO DONATED THE FARM TO STATE PURPOSES

By FRED E. JANETTE.

BATTLE CREEK, Mich.—A practical production plant, expertly managed, which will turn out tested and approved seed for planting by thousands of farmers throughout Michigan, thereby gradually raising the standard of a dozen staple crops in this State—that is what the Kellogg demonstration field near Gull Lake is intended to be.

This 600-acre tract of hill and dale, lake and woodland and, more extensively, crop land, was formally dedicated to the uses of the State in ceremonies on the estate on Aug. 11. There were about 1,500 witnesses of the ceremonies, officials of Michigan State College, agricultural agents and farmers and their families from many miles around. It is doubtful if many of these latter, let alone the rural population through the State, much less the dwellers in the cities, will begin to

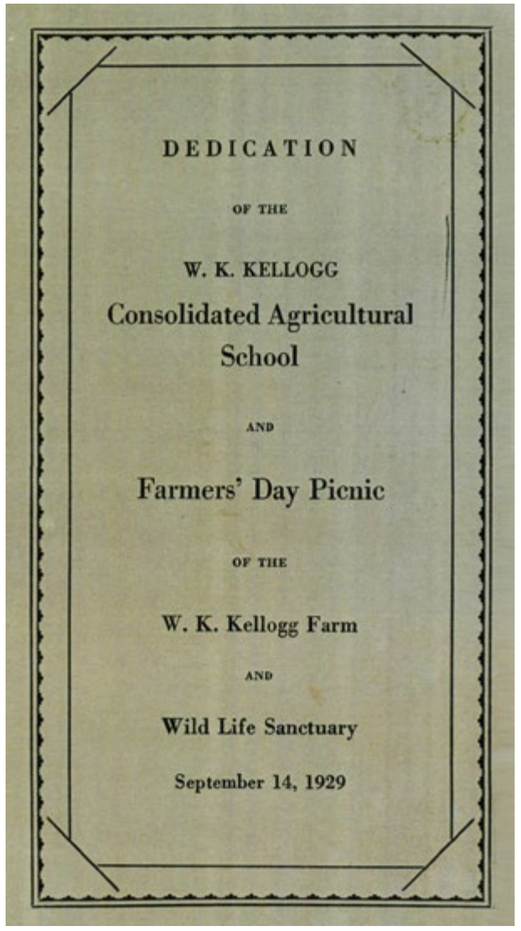
GEORGE A. GETMAN, FARM MANAGER.

MRS. ROSE ALTMAN

PART OF THE CROWD AT THE DEDICATION

GAMES and contests of various sorts were a part of the dedication program. Mrs. Louise Altman, of Hastings, in competition with a dozen men and women, won the prize for the volume and musical tone of her dinner call. She stood on the front porch of one of the farm residences and summoned an imaginary trops of field hands. The call was simple: "D-I-N-N-E-R," long drawn out.

THEY FED THE 1500 VISITORS. MRS. MARY ROSE HELLER (LEFT) WAS IN CHARGE OF COOK AND 13 WAITRESSES FROM THE KELLOGG PLANT



DEDICATION

OF THE

W. K. KELLOGG

Consolidated Agricultural School

AND

Farmers' Day Picnic

OF THE

W. K. Kellogg Farm

AND

Wild Life Sanctuary

September 14, 1929

Brochure advertising the dedication of the W.K. Kellogg Consolidated Agricultural School and the Farmers' Day Picnic of the Farm and Sanctuary in August 1929. Originally, this school served students from first through twelfth grade. Today, the Gull Lake Community Schools uses this building for a preschool and daycare programs. IMAGE: KBS Archives.

IMAGE TO LEFT: *September 1928 article from the Detroit Free Press about the Kellogg Demonstration Farm dedication ceremony on August 11 that attracted more than 1500 leaders and visitors from surrounding communities. Kellogg first deeded the property to the state, but by December 1928, ownership was transferred to Michigan State College.* IMAGE: KBS Archives

quality seed to local farmers. In December 1928, just four months after the dedication, Kellogg deeded the Farm and Sanctuary to the college, stating that he hoped MSC would use the Kellogg Farm to demonstrate soil-building and modern pasture dairy techniques.

Even after MSC began operating the Farm, Kellogg remained actively involved in its management for several years. One of the original dairy herdsmen, Glen Williams (Kellogg Farm dairy herdsman 1929–1972), recalled that Kellogg found out Getman was hunting geese on an adjacent property. Kellogg promptly fired Getman, stating, "Nobody that works for me is going to shoot my geese," presumably referring to Kellogg's efforts to protect the then-endangered Canada goose at the Sanctuary.

Dean Cox needed to find a new manager for the Farm and invited Colond M. McCrary, who had previously worked as a county agriculture agent and a farm crops extension agent, to tour the Farm and consider being its manager. McCrary was named to the position in late 1929 and was charged with making the Farm a self-sustaining operation. This was a daunting undertaking, considering the Farm was nearly $20,000 in debt due to miscommunication about managing

PHOTO TO LEFT: *Entrance to the Kellogg Farm in the 1940s. House in background is now used for graduate student and visiting researcher housing.* IMAGE: KBS Archives

expenses and income during the first year MSC held the property.

The initial focus was on soil improvement and good farming practices that included using crop rotation and cover crops. The primary crops grown on the Farm were alfalfa, corn and small grains such as wheat, rye and oats. Crops were marketed to provide income and also used on the farm as animal feed and bedding.

To improve soil fertility, hundreds of acres of green manure, mostly sweet clover and other legume cover crops, were grown and incorporated into the soil. Marl from Wintergreen Lake was applied, along with moderate amounts of commercial fertilizer. The success of these soil building activities was measured in terms of crop yield. During the first few years of operation, McCrary reported that the Farm's wheat yield was 15 to 20 bushels per acre. By 1945, the wheat fields were producing over 40 bushels per acre, much higher than the state average of 27.5. Similar increases in yield were noted for other farm crops as well.

The Farm's first large crop research project was begun by Dr. Harold Rather and Dr. Carter Harrison in 1929 and focused on a mixed forage crop of alfalfa and bromegrass. Its aim was to determine if the mixture would improve forage quality for pasture-based dairy cows, which was important during this time as most dairy farms were small, pasture-based operations. Bulletins reporting on the alfalfa-bromegrass work described it as: "An intensive study of alfalfa-bromegrass as a pasture crop was begun at Michigan Ag Station of Michigan State College in cooperation with the Bureau Plant Industry, USDA in 1929."

The mixture first tested on plots at the Farm was used in a field-scale planting at MSC's main campus in 1932 and Michigan farmers rapidly took up the practice. By 1943, Michigan cattle grazed on about 800,000 acres of alfalfa-brome pastures, and alfalfa-grass mixtures are still common Midwest forage crops.

The Farm's registered Guernsey cows provided the Manor House with milk and Kellogg picked it up at the Farm daily whenever he was in the area. The benefits of pasteurization

Diary herdsmen, Glen Williams, with a Guernsey cow at Kellogg Farm in the 1940s. PHOTO: KBS Archives

were becoming better known, and in 1924 the U.S. Public Health Service implemented the voluntary Standard Milk Ordinance that is known today as the Grade A Pasteurized Milk Ordinance. By 1930, over 500 U.S. cities mandated pasteurization for milk and dairy products.

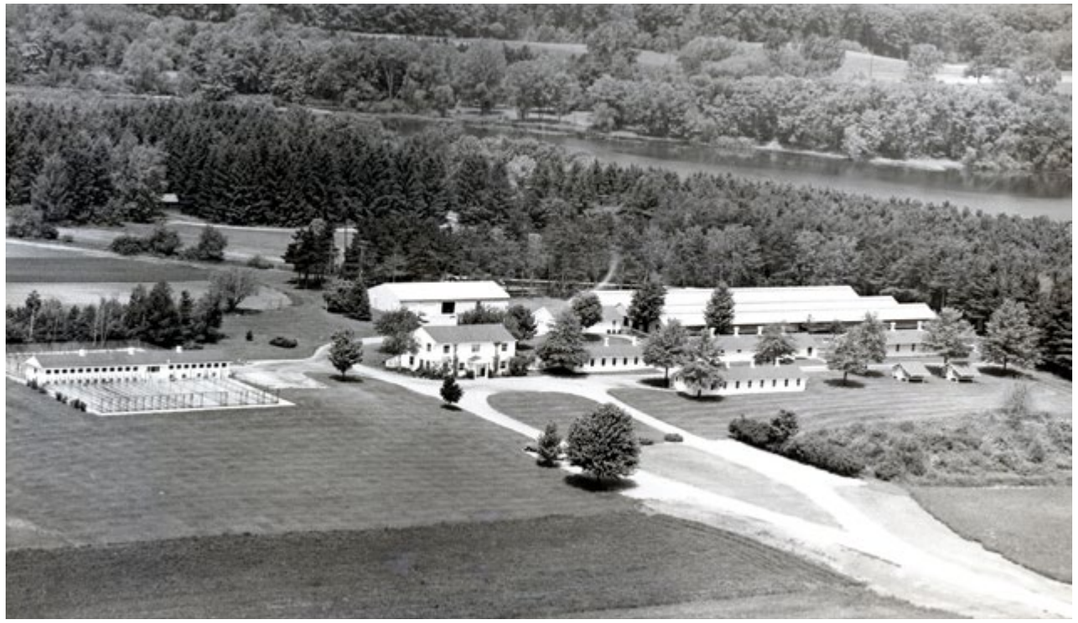
This recommendation prompted Kellogg to purchase a pasteurizer, bottling equipment and everything needed to adhere to this new recommendation, though it was not a state requirement until 1947. The Guernsey herd was notably productive and produced more milk then Kellogg could use. Though delivery was not possible at the time, anyone could come and purchase milk at the Farm.

Following U.S. entry into World War II, the U.S. Army needed modern hospitals to care for the ever-growing number of wounded soldiers who were returning home. It established the Percy Jones Army Hospital in Battle Creek in 1942. Kellogg Farm supplied the hospital with milk during the entire time it was in operation (1942–1953), and its need often exceeded what the Farm could produce, requiring purchases from additional dairy farms to meet demand. However, the Guernsey milk from the Kellogg Farm was preferred, so the Hospital paid a premium for it.

As Glen Williams stated in a 1990 interview about his time as Kellogg Farm's dairy herdsman, "[There was] nothing prettier than golden Guernsey milk in a bottle. It has a color all its own, due to the fact that it's 5% butterfat and the cream far down on the bottle made it attractive to everyone." When the Percy Jones Army Hospital closed, the dairy lost its largest customer, prompting a change from milk bottles to bulk tanks for pasteurization. This simple change revolutionized the entire milk marketing system at the Farm and laid the groundwork for other changes.

In 1944, two projects came online at the Kellogg Farm that would foreshadow the Farm's contribution to grazing and animal nutritional research. The first was a pastured sheep study that looked at differences between several pasture grazing systems. The second study was conducted from 1944 to 1954 when Kellogg Farm oversaw a nutrition study in cooperation with MSC's dairy, soils and crops departments and the American Dairy Association. It was located on 208 acres of leased land bordering the Kellogg Bird Sanctuary and Kellogg Farm. Though once a productive livestock farm, the land was generally considered run-down, so it was an ideal setting for a nutrition project.

To improve soil fertility, hundreds of acres of green manure, mostly sweet clover and other legume cover crops, were grown and incorporated into the soil.



Aerial photo of the Kellogg Feed Research complex off 40th Street in the late 1940s. This complex now serves as the base of operations for the KBS Physical Plant that is responsible for all of the grounds and buildings of KBS. PHOTO: KBS Archives

At this time it was thought that depleted soils produced low crop yields and lower-quality animal feed. The project compared the health, vitality and reproductive fertility of dairy cows who ate feed that had been grown on depleted soils with that of cows whose feed was harvested from soils that had been liberally supplied with fertilizer.

In 1955, MSC professor and agricultural chemist Dr. Clifford W. Duncan received the Borden Award from the American Dairy Science Association for his work on the project. The study showed no difference in the nutritional value of feed crops grown on fertilized land when compared to feed crops produced on unfertilized soil. Higher crop yield appeared to be the only benefit to fertilizing marginal lands.

The Farm also hosted poultry production research and demonstration projects. Marketing eggs and chickens generated revenue that helped ensure financial stability, and also fed the Kellogg family, students and staff at the Farm and Sanctuary. Harrison, the faculty who

The Kellogg Forest

W.K. KELLOGG BOUGHT TWO TRACTS of degraded and abandoned farmland near Augusta, Michigan in Fall 1931. Shortly thereafter, he donated the land to Michigan State College calling it the W.K. Kellogg Reforestation Tract. Today we know it as the W.K. Kellogg Experimental Forest. Kellogg's vision was to return the land to productivity through tree planting and reforestation rather than use it for agriculture. The Forest was originally part of what was then called The Kellogg Station, but today is administered by MSU's Department of Forestry.

The Forest originally emphasized demonstration of successful methods for establishment and growth of various forest tree species on degraded agricultural land. Since then, research at the Forest has expanded to a variety of topics important to forest managers. Over 130 research and extension publications based on research done at the Forest have had a large impact on forest management and conservation in the region.

One example is genetic studies conducted at Kellogg Experimental Forest to determine what seed sources for Scotch pine were best for Christmas trees based on color, growth habit and timber production. Research done there led to the development of the Spartan spruce hybrid tree. In addition, many federal herbicide and fertilizer guidelines utilized in forestry and arboriculture industries relied heavily on research conducted at the Forest. The Forest also pioneered row-thinning strategies for red pine and white pine plantations, and supported groundbreaking research on the habitat requirements of the gypsy moth and emerald ash borer, two of the most devastating exotic, invasive forest pests in the United States.

The Kellogg Experimental Forest continues to host a variety of research projects and has over 150 permanent research plots used by government agencies, MSU faculty and visiting researchers from across the world.

The staff of Kellogg Experimental Forest also collaborates with KBS faculty and staff on research, public outreach and volunteer projects. The Forest remains an important part of the community and welcomes visitors to enjoy biking, hiking, horseback riding and cross-country skiing, and includes several interpretive trails and a picnic area.

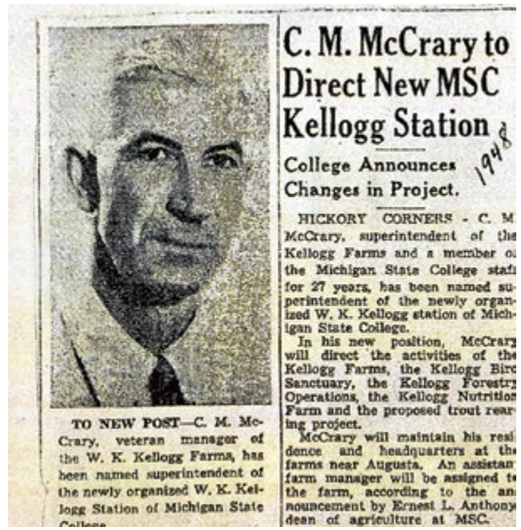
Originally built in 1973, this covered bridge was moved to its current location inside the entrance to the Kellogg Forest in 2001. The bridge provides both a scenic stopover for visitors to the Forest and a living classroom to promote water resource conservation. The relocation and restoration of the bridge was a collaborative effort led by the Augusta Creek Watershed Council working with the North Country Trail, Kellogg Forest, KBS staff and volunteers, and was supported by many local businesses and foundations. IMAGE: KBS

co-led the alfalfa-bromegrass mixed forage research, remarked about his experience on the Farm, "We could buy roosters down here at a year old, and feed them to graduate students. Some of these guys could eat a whole rooster and six loaves of bread."

The Feed Research project, which began in 1948, was a nearly 30-year collaboration between the Kellogg Company and Kellogg Farm that focused on animal feed. The Kellogg Company contracted with Kellogg Farm to study whether its cereal production by-products might offer potential as feed for chickens, hens, turkeys, dogs, chinchillas, mink, calves and hogs.

In 1948, McCrary was named Superintendent of what was at that time called The Kellogg Station, comprising the Sanctuary, Farm and Forest, and continued his farm manager duties. During McCrary's tenure as Kellogg Farm Manager and Station Superintendent, he enjoyed good working relationships with managers at the Sanctuary and the Forest, due to his long tenure and personal relationship with Kellogg.

In the early 1950s, the Kellogg Farm also supported research on hybrid seed corn development. Hybrid corn is produced by crossing two seed corn strains, and its use was increasing because it raised yields by nearly 20 percent. The process of producing new lines was labor-intensive and took years. At the start of the Michigan corn hybrid program, Kellogg Farm produced all of the parent stock seed corn. In 1952, the Farm dedicated a 15-acre field to grow the corn that would be sold to Michigan seed



C. M. McCrary to Direct New MSC Kellogg Station

College Announces Changes in Project.

1948

HICKORY CORNERS - C. M. McCrary, superintendent of the Kellogg Farms and a member of the Michigan State College staff for 27 years, has been named superintendent of the newly organized W. K. Kellogg station of Michigan State College.

In his new position, McCrary will direct the activities of the Kellogg Farms, the Kellogg Bird Sanctuary, the Kellogg Forestry Operations, the Kellogg Nutrition Farm and the proposed trout rearing project.

McCrary will maintain his residence and headquarters at the farms near Augusta. An assistant farm manager will be assigned to the farm, according to the announcement by Ernest L. Anthony, dean of agriculture at MSC.

TO NEW POST—C. M. McCrary, veteran manager of the W. K. Kellogg Farms, has been named superintendent of the newly organized W. K. Kellogg Station of Michigan State

Local newspaper article noting the promotion of Colond M. McCrary from Kellogg Farm Manager to Kellogg Station Superintendent in 1948. IMAGE: KBS Archives

corn producers, who then harvested and distributed enough seed to plant over a quarter million acres of corn in 1954.

McCrary passed away suddenly in 1956 after working as the Farm Manager for nearly 20 years and Station Superintendent for nearly 10 years. During his tenure he coordinated programs and projects across the Farm, Sanctuary and Forest, and his hard work and dedication to MSC and the Kellogg Station is memorialized on a monument along a popular hiking loop and intersection with the North Country Trail in the Kellogg Forest.

McCrary was also instrumental in developing conference center facilities at the Gull Lake site to better serve MSC faculty, staff and students as

well as the public. The dining hall building next to the Manor House is named after him. It took nearly four years to find a permanent replacement for McCrary, and Harold Webster was hired as the Kellogg Farm Manager and Acting Station Superintendent in 1960.

In the late 1970s,research at the Farm shifted to better match agricultural industry changes in crop and dairy production. This was driven by a combination of economic and environmental concerns that were increasingly affecting Michigan farm profitability, particularly for dairy farmers. On the heels of a growing national trend to drink low-fat milk the Kellogg Farm Guernsey cows were sold in 1978 and replaced with Holsteins. The larger-bodied Holsteins produced a higher volume of milk that was naturally lower in butterfat content, making the breed a more economical choice for dairy farmers. This prepared the Farm and Dairy for a new focus on research in dairy herd and farm management.

The increasing use of chemical fertilizers and pesticides, changes in tillage practices and a stronger focus on efficiencies to increase production raised concerns about how farming practices were affecting the environment, particularly water quality. This led to calls from practitioners, federal and state agencies, and the public for research on what has been termed a "systems approach" to farming, that focuses on managing agricultural lands in the context of long-term interrelationships with the environment. There was also recognition of a need to provide educational resources to farmers, recruit a new generation of farmers and agricultural professionals, and provide student, public and professional training that highlighted new farming practices.

At this same time, the Gull Lake Laboratories, which housed the academic programs of the station, were combined with Kellogg Bird Sanctuary and Kellogg Farm, collectively known as the W.K. Kellogg Biological Station (KBS).

PHOTO TO LEFT: *Memorial monument to Colond McCrary, Kellogg Station Superintendent (1948–1956), which included the Farm, Sanctuary and Forest. The monument is located in the Kellogg Forest on a spur off the North Country Trail.* PHOTO: KBS

A Holstein calf resting in the barn at the Kellogg Farm. The Farm switched to Holstein cows in the late 1970s when demand for low-fat milk products in the U.S. market increased. PHOTO: KBS

Farm Manager Harold Webster (right) conferring with Sanctuary Manager Roswell Van Deusen (left) regarding the construction of new facilities at the Farm in support of the Rural Resources and Education grant, funded by the W.K. Kellogg Foundation in 1991. During his tenure as Farm Manager (1960–1988), Webster oversaw a number of improvements at the Farm that increased research, outreach and education. IMAGE: KBS Archives

This led to interest in developing research on agricultural systems and the impact on farming communities that resulted in the development of a proposal to the W.K. Kellogg Foundation titled, "Rural Resources Education at the W.K. Kellogg Biological Station," or RRE project. In this proposal, KBS in partnership with researchers from main campus and Michigan State University (MSU) Cooperative Extension Service (MCSE; now MSU Extension, MSUE) specialists and agents, laid out an education plan that focused on farming methods that were beneficial to both farmers and the environment.

The grant was funded in 1981 and as part of this project, the Kellogg Farm dairy operation was moved northwest from the original Kellogg Farm site to a small rise that overlooks Duck Lake. The dairy was upgraded so it could serve as a demonstration site for Michigan dairy farmers on the use of cutting-edge management practices for large, high-producing herds. Facilities were designed to support applied research on a herd management and farming operations

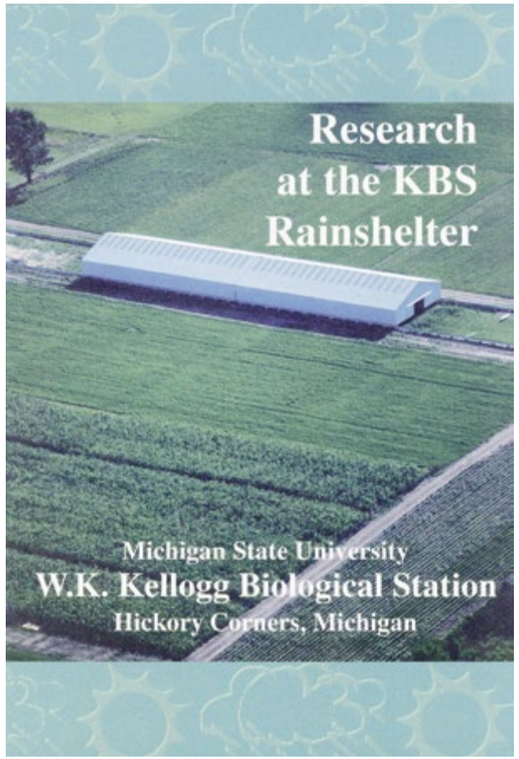
In the late 1970s, research at the Farm shifted to better match agricultural industry changes in crop and dairy production. ... driven by a combination of economic and environmental concerns that were increasingly affecting Michigan farm profitability.

The milking facility at dairy barn in the mid-1980s, shortly after moving the Kellogg Farm to its current location on 40th Street, north of Duck Lake. PHOTO: KBS Archives

that addressed some of the major environmental issues facing the livestock industry. Rob Ashley was hired in 1984 to be the manager of the new dairy operation at the Kellogg Farm.

The RRE grant included a focus on formal education for a new generation of farmers and so included funds for additions to KBS' educational facilities. This included adding a Farm Learning Center at the original Kellogg Farm site, new student dormitories and renovated research laboratories in the Stack Building to support classes and educational programs. The Academic Building was built as a connection to the Stack Building to provide research labs and offices for faculty members and their students, a computer workroom and classroom, an auditorium and meeting rooms.

The RRE grant also provided for the formation and support of a special unit of Michigan State University Cooperative Extension that was to focus on public outreach and informal education for professionals, adults and children about what was learned about agricultural systems and the landscapes that surround them through research programs at KBS and MSU. This group, known as the KBS Land and Water Unit, began offering



Brochure (late 1980s) explaining the rainshelter and associated research at the Farm. IMAGE: KBS Archives

high-quality outreach activities on site in 1983 and was an active Extension unit at KBS for over 20 years.

As part of the RRE grant, MSU also made a commitment to developing more research in agriculture and natural resources at KBS. To coordinate this effort, Dr. Bernard Knezek, MSU Professor of Crop and Soil Sciences, was appointed as the Kellogg Biological Station Associate Director for Agricultural and Natural Resources Programs. Knezek promoted the development of new research programs in agriculture at KBS and attracted several campus-based faculty to conduct studies using KBS lands and facilities.

Among the faculty recruited to work at KBS was Dr. Joe Ritchie, who held the Homer Nowlin Endowed Chair for Water Resources at MSU. Ritchie constructed one of the world's largest fully automated rainshelters at KBS in 1984 to support his research on effects of drought on crop production. The facility was essentially a large building on rails that automatically moved over crops to shield them from natural precipitation and also was equipped with sprinklers so water could be added at different times. The rainshelter was used for nearly a decade to investigate the effects of drought stress and irrigation timing on crop growth and production. Crop growth modeling, variety development, and irrigation scheduling were just a few of the topics studied under the large rainshelter during its operation.

In addition, a five-acre apple orchard was established by Dr. Stuart Gage, Department of Entomology, to study how insect pests could be controlled through crop management strategies, such as vegetable intercropping and manipulating predator-prey relationships. One project compared how chickens and geese could control insect pests in apple orchards. At the end of the project, the birds were harvested and served for dinner at the student's wedding reception. Today about two acres of the orchard remains and is used for research on the genetics of insects and microbes that are potential pests of apples.

During this time, the Energy Integrated Farming Systems program was established at KBS and administered by the Michigan Agricultural Experiment Station (MAES; now MSU AgBioResearch) and the Michigan Cooperative Extension Service. Knezek brought Dr. Earl Erickson, Professor of Crop and Soil Science, on board to help with this effort. When this program began, fewer than 10 field crop studies were done at KBS each year, and Erickson was charged with expanding KBS-based crop and soils research. Jim Bronson was hired as a soil technician in 1981 to assist with this expansion, and in 1988 Bronson became the Kellogg Farm Manager.

Erickson was successful at attracting campus-based faculty members to work at KBS and greatly expanded agricultural research at the Kellogg Farm. To manage this increase in research activity, Erickson and Bronson proposed constructing a modern field lab surrounded by 40 acres, divided into small plots with relevant infrastructure, to be called the Farming Systems Center (FSC). The FSC, funded entirely by MAES, rounded out the modern agricultural facilities needed to fulfill the goals of the Rural Resources

MSU Extension event at the Farm (~1980) explaining research on the use of irrigation for row crops in Michigan. PHOTO: KBS

Education project and provided much-needed support for agricultural research projects at KBS.

Besides supporting field research projects, the FSC also hosted educational opportunities for students, visiting scientists and farmers. Though staffing levels limited the number of programs that the FSC could support, research assistance was provided to these programs when possible. The FSC was also heavily involved in the Michigan Energy Conservation Program (MECP) through the 1980s. This included research on conservation tillage, nutrient and manure management, integrated pest management and irrigation scheduling.

The MECP funded the establishment of a cover crop nursery at KBS, and for two years it was available for farmers to view the growth habits of nearly 40 grass and legume species. Cover crop research is still an important component of research on sustainable agriculture at KBS. The FSC also supported outreach and education programs on non-agricultural systems at KBS. For example, grain sorghum and corn were planted in wildlife food plots at the Bird Sanctuary's 4-H Wildlife Pond Demonstration Site.

In the decades following the modernization of the Kellogg Farm dairy in the 1980s, it functioned as a high-quality demonstration facility. This included demonstrating the value of natural ventilation as opposed to the traditional closed dairy buildings. It also supported research on feeding and ovulation synchronization designed to increase herd reproduction. The dairy's staff also collaborated with the Upjohn Company researching the use of bovine somatotrophin (BST) to increase milk production before the product was commercially available.

A major change in KBS agricultural research came about in the late 1980s when a group of campus and KBS researchers developed a proposal to the National Science Foundation (NSF) to establish a Long-Term Ecological Research (LTER) project focused on row-crop agriculture at KBS. The KBS LTER is the only site in the 28-site LTER network focused on agriculture, and has raised the national and international prominence of KBS agricultural research. Dr. G. Philip Robertson led the effort to write the KBS LTER proposal while he was a visiting research faculty at KBS. He was hired to a permanent position at KBS and the Crop and Soil Sciences department in 1989. Robertson served as the LTER's lead investigator from 1988 to 2016.

Studies at the KBS LTER have made important contributions to our understanding of the

KBS researchers leading a field tour of the Living Field Laboratory experiment for extension educators from the Midwest. PHOTO: KBS

ecological and evolutionary processes in agricultural systems and to the adoption of sustainable agricultural practices. To date, more than 1,000 publications have come from the KBS LTER, including peer-reviewed publications, dissertations and published data sets. The history and contributions of the project were summarized in the 2015 book, *The Ecology of Agricultural Landscapes: Long-Term Research on the Path to Sustainability.*

The Living Field Laboratory (LFL) project was initiated by Dr. Richard Harwood, soon after he was hired at MSU as the first Mott Chair of Sustainable Agriculture in 1994. The LFL was an important addition to agricultural research at KBS as it linked basic research done at the LTER to applications in agricultural production. It included a long-term corn-soy-wheat rotation designed to test concepts gleaned from the LTER project and to demonstrate the biology of sustainable cropping systems, and was active from 1994 to 2014.

Research done at the LFL provided the basis for a number of MSU Extension (MSUE) educational programs and publications. This included a series on Cropping Systems Ecology that included contributions from MSUE staff associated with the KBS Land and Water Unit. An important distinction between the LFL and LTER is that LFL rotations included manure as a nutrient source, and the LTER does not. This provided an important linkage between animal and crop production systems that were, and still are, important to many Michigan farmers.

The KBS LTER is the only site in the 28-site LTER network focused on agriculture, and has raised the national and international prominence of KBS agricultural research.

The KBS LTER's success in bridging research focused on basic and applied questions related to the sustainability of agricultural production systems provided valuable rationale for expanding research at the Kellogg Farm to include bioenergy crops and novel technologies in dairy production. In 2008, MSU researchers began collaborating with faculty at the University of Wisconsin–Madison (UW) and several other institutions on a U.S. Department of Energy (DOE) proposal to establish one of the country's three Bioenergy Research Centers (BRCs). The BRCs were intended to develop and test new technologies with perennial bioenergy crops to produce fuel, primarily for transportation. The MSU-UW group submitted a proposal a focus on research related to bioenergy crop sustainability.

The proposal was funded and in 2007 established the Great Lakes Bioenergy Research Center

Olivet high school students planting native species into biofuel experiment plots near their school in 2010. The project was funded by the NSF as part of the KBS K-12 Partnership and LTER Schoolyard program. PHOTO: KBS

(GLBRC) at MSU and the University of Wisconsin. The GLBRC includes a large field experiment at KBS, initially duplicated at UW's Arlington Agricultural Research Station, designed to compare the productivity and other functions of bioenergy cropping systems, including annual crops such as corn and soybeans and a wide variety of perennials, including native prairie species.

At the same time, concerns that the size and management system at the Kellogg Farm dairy were no longer relevant to the industry, where increasingly large herd sizes were becoming the norm led to discussions about how to change the management system at the dairy. A group of campus and KBS researchers, led by Dr. Jeff Armstrong, then Dean of the College of Agriculture and Natural Resources working with Dr. Michael Hamm, Harwood's successor as the Mott Chair for Sustainable Agriculture, Dr. Karen Plaut, Professor and Chair of Animal Science; and Dr. Katherine Gross, University Distinguished Professor and KBS Director developed a proposal to the W.K. Kellogg Foundation to establish a pasture-based dairy program at KBS. The new dairy would provide a focus for a MSU effort to expand research on dairy systems to address the

The appeal of adding robotic milking to a small pasture-based dairy farm was to conduct research and demonstrate technology that would be of interest to farmers from all types of dairy operations.

needs of small and mid-sized farms. It also provided an opportunity to better link Kellogg Farm research on crop and animal production systems. The grant had strong support from Dr. Richard Foster, then a WKKF vice-president who later was named W.K. Kellogg Chair in Food, Society and Sustainability at MSU.

A novel aspect of this proposal was incorporating a voluntary robotic milking system into the Kellogg Farm dairy operation. Robotic milking was becoming widely adopted in Europe and New Zealand dairy operations. But the technology was relatively new in North America, and was rarely used in conjunction with pasture grazing. The appeal of adding robotic milking to a small pasture-based dairy farm was to conduct research and demonstrate technology that would be of interest to farmers from all types of dairy operations.

Robotic systems provide the ability to collect real-time data on cow health and milk production that are valuable for research on management of pasture dairy systems. When linked to GPS sensors that monitor cow movement and grazing, this system provides data on grazing patterns and individual cow production rates,

Robotic milking machines in use at the KBS Pasture Dairy Center. PHOTO: KBS

allowing the option to adjust individual milking rates (i.e., the number of times a cow is allowed to enter the robot and be milked) to optimize milk production. The Kellogg Farm's dairy operation is now known as the Pasture Dairy Center (PDC) and also has incorporated other novel technologies to allow for efficient use of pastures as forage, including daily monitoring of pasture production and a computerized gate system to ensure that the cows moved among the pastures and were milked as often as needed.

Gross took the new pasture dairy project one step further toward demonstrating how sustainable practices could be incorporated into agriculture, when she proposed that the new facility obtain Leadership in Energy and Environmental Design (LEED) certification. Until then, no North American agricultural building had been LEED certified. Achieving LEED certification involves meeting a number of metrics, including energy efficiency, which was an important factor in the Dairy Center's designation as Silver LEED certified in 2008.

Developing a new research program at the PDC meant focusing on a systems approach to dairy management that studied grazing and milk production in an ecological context. It required adding a new faculty member with training in agriculture and ecological systems who could lead the research. Dr. Santiago Utsumi joined the KBS-based faculty in 2009 as an Assistant Professor of Animal Science just as the herd was transitioning to the new facility. In addition to establishing research on grazing systems, Utsumi incorporated a system to measure greenhouse gas production from individual cows. These data could then be related to their feed intake and milk production, providing an important linkage to LTER and GLBRC research on how agricultural practices can be modified to reduce negative effects on the environment and maintain economically profitable production levels.

The Pasture Dairy Center was one of the first agricultural buildings in the U.S. to acquire Leadership in Energy and Environmental Design (LEED) certification in 2008. PHOTO: KBS

Dr. Brook Wilke, Kellogg Farm Manager since 2014, sharing with 2018 summer undergraduate researchers and interns how the Kellogg Farm supports research and demonstration projects by KBS, MSU and other researchers on agricultural systems. PHOTO: KBS

In 2014, Dr. Brook Wilke was hired as Kellogg Farm Manager, replacing Jim Bronson who retired after working more than 40 years at the Farm. Wilke is committed to maintaining the research focus of the Farm by supporting a wide variety of agricultural research and outreach that enhances societal appreciation and understanding of agricultural systems and environmental stewardship.

Summer students (1959) examining specimens. At that time the Carriage House was used for teaching and research labs. PHOTO: Michigan State University Archives and Historical Collections

Chapter Five

The Academic Unit of the Station

"Long-term research at field stations produces baseline and sentinel data that can be used to study ecosystems at a time when human activities are altering nature at an unprecedented rate."

National Research Council, 2014

From its founding, the W.K. Kellogg Biological Station has supported research, education and outreach focused on conservation, agriculture, wildlife biology and related disciplines. These are all important to Michigan State University's land-grant mission. Over the last 60 years, the mission of KBS has expanded to include research and educational activities in ecology and evolutionary biology designed to understand the functioning "... of natural and managed ecosystems and their linkages to society." KBS is recognized nationally and internationally for its excellence in research, graduate and undergraduate student education, post-doctoral training, and public outreach related to these issues.

The Station's location in southwestern Michigan provides unique opportunities for research and related programming on ecological and environmental issues. Prior to widespread European settlement, this area was dominated by oak-hickory forests with rivers, streams, lakes, ponds and wetland areas interspersed with small prairies and oak savannahs. Agricultural development began in the 1830s and though the soils are not considered particularly fertile, agriculture is a dominant feature of the landscape.

The landscape surrounding the Station today is characterized by a mix of farm woodlots, conifer plantations, active and abandoned agricultural fields, patches of restored native grasslands, small lakes and wetland complexes. The main KBS academic and research buildings are situated on Gull Lake, one of southwest Michigan's largest and deepest inland lakes, with a surface area of just over 2,000 acres and a maximum depth of just over 100 feet.

The diversity of habitats surrounding the Station motivated Dr. Walter Morofsky and Joseph Stack, both professors of Zoology at Michigan

Professor Joseph Stack (white shirt, second row, third from left) with students and others participating in the Kellogg School of Biology in the 1930s. PHOTO: Michigan State University Archives and Historical Collections

Photo of a "field vehicle" used at the Station to transport students to study sites in the 1930s. PHOTO: Michigan State University Archives and Historical Collections

State College (MSC, later to become Michigan State University), to approach W.K. Kellogg in the late 1920s about using the Farm and Sanctuary properties for a summer biology program focused on field experiences for students training to be teachers. Stack and Morofsky recognized the value of teaching biology outdoors as a way to solidify concepts and provide real-world application of lessons. They proposed what became the W.K. Kellogg School of Biology that ran from 1929 to 1939. Initially, the School focused on providing pre-service science teachers experiences in field biology and later expanded to include students pursuing degrees in biological sciences. The School operated from buildings at the Farm and Sanctuary, with a farmhouse on 40th Street, known as the "Teachers Cottage," providing housing.

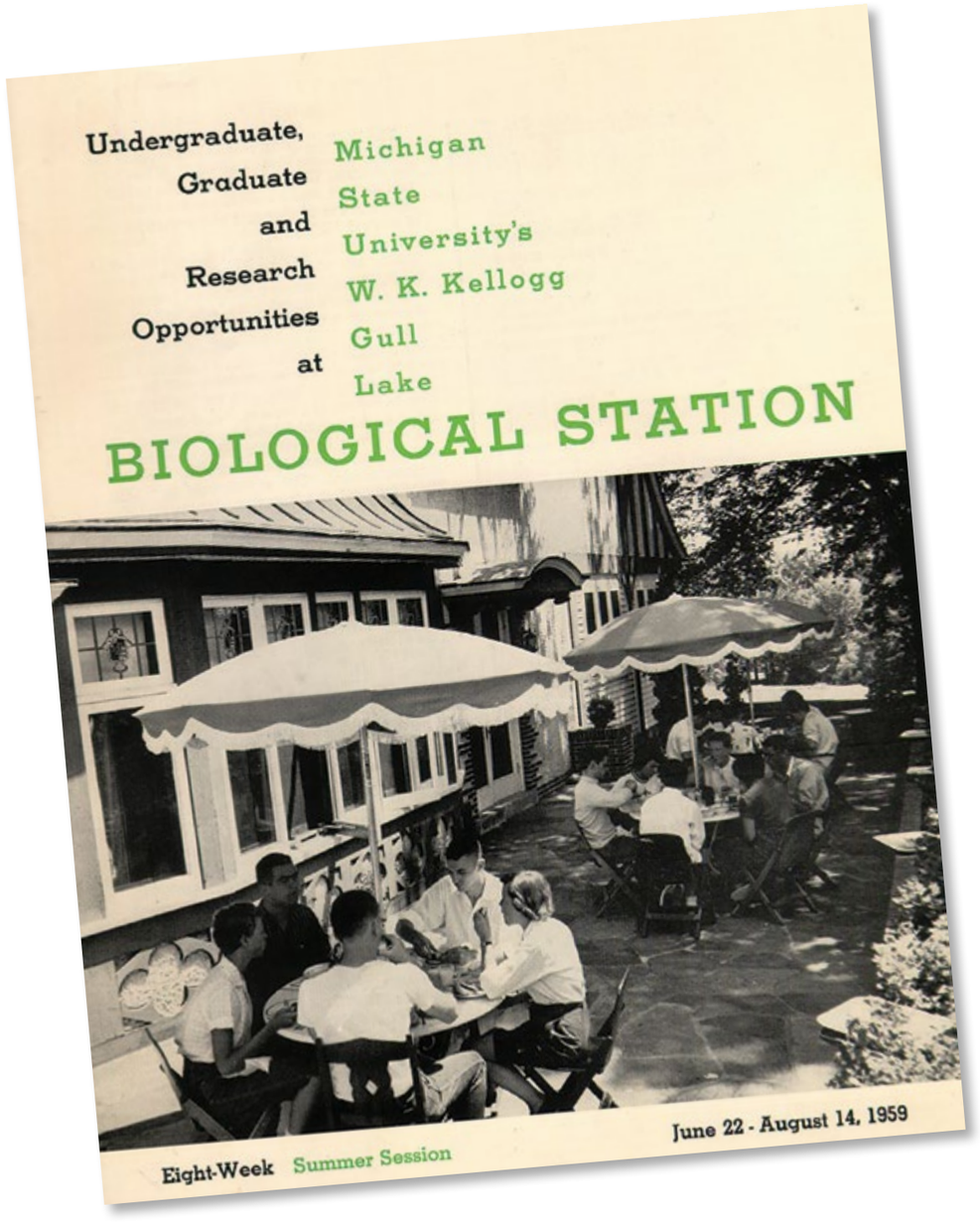
Education programs at the Station came to a halt during World War II. Following Kellogg's death in 1951, the W.K. Kellogg Foundation (WKKF) deeded the Manor House and Estate property to MSC for use as a biological education and research station. The gift of the Kellogg Estate to MSC provided the opportunity to expand summer programs beyond those offered at the Farm and Sanctuary. Morofsky worked closely with Colond McCrary, the Station superintendent, to develop programs for the new Station. The Estate included buildings that could be used for housing, classrooms, laboratories and meetings, but more improvement would be needed for the site to support research and education programs.

In 1954, Morofsky was named as the first faculty director of the W.K. Kellogg Gull Lake Biological Station. Morofsky's primary responsibilities were coordinating summer education and biological research programs and expanding the housing and teaching facilities. Morofsky and McCrary submitted a proposal to the Kellogg Foundation to address these needs and transition the property from the military use it had supported during and after WWII. The request was approved and this funding supported renovating the Manor House for women's housing and improvements to create classrooms and labs for summer teaching and research programs at the Farm, Sanctuary and Forest.

To ensure continued growth of summer programs at the Station, MSC formed an advisory board to help Morofsky organize, plan and implement new activities. The board included faculty members from a number of campus departments, including Microbiology and Public Health, Botany and Plant Pathology, Fisheries and Wildlife, Entomology, Zoology, and Guidance and Counselor Training (a high school teacher training program).

Dr. Walter Morofsky, the first faculty director of the W.K. Kellogg Gull Lake Biological Station (1954–1963). Morofsky was based on the main campus during the academic year and in residence at the Station in the summer.
PHOTO: Michigan State University Archives and Historical Collections

Many of the board members were highly regarded both nationally and internationally for their research and were influential campus leaders. Board members included, Dr. William B. Drew, Chair of Botany and Plant Pathology, was instrumental in establishing the herbarium at MSC and was the technical advisor for the creation of the W.J. Beal Botanical Garden on



"Class photo" from 1958 summer session at the Kellogg Gull Lake Biological Station. Dr. T. Wayne Porter (left, standing in bow tie) and Dr. Walter Morofsky (standing center) with summer students and their families in front of the Manor House.
PHOTO: Michigan State University Archives and Historical Collections

campus. Dr. Ray Hutson, Chair of Entomology, was known for his work on fruit pests. A scholarship in his honor, the Ray and Bernice Hutson Memorial Endowment, continues to support graduate and undergraduate student research and travel in the Entomology department.

In 1954, the Station hosted the first formal summer session of courses. The brochure marketing this program included the tagline, "Enjoy a profitable summer of field study and healthful recreation — attend the W.K. Kellogg Gull Lake Biological Station of Michigan State College."

IMAGE AT LEFT: *Brochure cover advertising the 1959 summer programs at the Kellogg Gull Lake Biological Station.*
IMAGE: KBS Archives

Courses offered that summer and into the early 1960s were from Microbiology and Public Health, Botany and Plant Pathology, Fisheries and Wildlife, Entomology, Zoology, Parasitology, Science Education, and Geography. Tuition in 1954 for Michigan residents was $15 for up to 5 credits; $35 for 6 to 10 credits, and $47 for 11 to 14 credits. This was significantly less than the costs for in-state students to enroll in courses offered at the University of Michigan biological station in Pellston, Michigan.

From the start, the Station's unique resources for research and teaching were well recognized. In addition to having access to the geographically and biologically diverse landscapes around the Station, researchers and instructors could use the

greenhouse located on the Estate and buildings at the Farm and Sanctuary. Spruce Lodge, at the Bird Sanctuary, was used for classes in ornithology, zoology and "aquatic studies." The Kellogg Feed Research Buildings, where the KBS Physical Plant is now located, were built in 1949 by the Kellogg Company for a joint feed research project with the Kellogg Farm. These buildings provided laboratory research space, as well as offices and reception space for summer students and faculty members.

Among the faculty members who taught that first summer was Dr. T. Wayne Porter, a newly hired faculty in the Zoology Department, who taught invertebrate zoology. Porter taught and conducted research at KBS for more than 20 years. He is remembered as an enthusiastic teacher, mentor and naturalist with a fondness for cigars and memorable natural history lessons. Porter's research interests included non-native freshwater jellyfish and several crayfish species that occurred in Augusta Creek, Otis Lake, the Crooked Lake system, and other aquatic habitats in southwest Michigan. His grandson, Thomas Porter, who spent many summers at KBS when he was growing up, established the first endowed graduate student fellowship at KBS, the T. Wayne and Kathryn Porter Graduate Fellowship, in honor of his grandfather.

Dr. T. Wayne Porter and students enrolled in a 1958 summer Acarina course (mites and ticks). Note pipes held by Porter (far right) and several students. PHOTO: Michigan State University Archives and Historical Collections

In 1955, MSC officially became Michigan State University (MSU) of Agriculture and Applied Science, and with this transition came a number of administrative changes that affected the Station. Two colleges formed in this transition, the College of Science and Arts (now Natural Science) and the College of Agriculture (now Agriculture and Natural Resources), included departments with faculty who were involved in KBS research and educational programs and so would have interest in the Station.

It was clear to many of those involved in these transitions that the Station was important to MSU as a hub for field-based learning and research. However, efforts to expand the summer programs were limited by the lack of appropriate classrooms, labs and housing. The Manor House was still used for classrooms and labs and was the women's dormitory. The library, dining hall and bookstore were also in the Manor House. Male students and faculty lived in what is now called the Carriage House. A WKKF grant in 1956, funded construction of three cabins south of the Carriage House for men's housing, but married students were still housed in a 16-unit "trailer camp" on the Estate's lawn, according to the early brochures.

Despite the cramped quarters, the Station attracted outstanding researchers from other institutions who recognized its potential for research and educational programs. In 1957, Dr. Henry J. Oosting, Chair of the Botany Department at Duke University and former president of the Ecological Society of America, spent six weeks at the Station as a visiting professor.

Cabins constructed in 1957 with funding from the W.K. Kellogg Foundation to provide housing for male students. The cabins were later used as classrooms and today as housing for conference groups and researchers.
PHOTO: Michigan State University Archives and Historical Collections

After his visit, Oosting wrote a letter to Dr. Milton Muelder, Dean of the MSU College of Science and Arts, stating that, "... the potential of the Kellogg Station is tremendous." He encouraged the development of year-round research and graduate training programs.

With labs bursting at the seams and the married student housing trailers quickly wearing out, Morofsky and McCrary worked with Dean Muelder and MSU President John A. Hannah to develop another proposal to the Kellogg Foundation to improve the Station's facilities. The proposal funded construction of the red brick buildings on the Estate grounds that included a research and teaching building (named for Stack), a dining hall (named for McCrary), and married student housing (Sherriff and Van der Ploeg apartments).

Construction of these buildings was completed in 1961. This grant also supported construction of a reception building and museum at the Bird Sanctuary and major upgrades to the Kellogg Farm that were completed in 1963. To secure this funding from WKKF, MSU committed to expanding year-round programs at the Station and to hiring new staff that included hiring a year-round, resident director.

In 1964, MSU officially dropped "Agriculture and Applied Science" from its name and Dr. George Lauff was recruited as the Station's first year-round resident faculty director. Lauff received his undergraduate and master's degrees from MSU before earning a Ph.D. in limnology at Cornell University. While at Cornell, Lauff spent summers at the University of Montana field station at Flathead Lake and the University of Washington Friday Harbor Laboratories. In 1953, Lauff joined the faculty at University of Michigan, where he spent time at their biological station in Pellston. He later became the Director of the Marine Science Institute and Research Coordinator for Sapelo Island of the University of Georgia, where he was expected to develop a year-round research facility. An unfortunate change in funding for

Postcard from the early 1960s showing the newly constructed visitor center and administration building of the Kellogg Bird Sanctuary. Construction of these buildings, along with the 'red brick' buildings on the Gull Lake campus of the Station, was funded by a grant from the WKKF. IMAGE: KBS Archives

the Sapelo project led to his reconsidering, and accepting, an offer from MSU to be the new Director of the Kellogg Biological Station in 1964.

Lauff's experiences at field stations provided him with valuable lessons about management and funding for biological field stations that he brought to this new position. Importantly, he recognized that the Station needed a resident faculty to maintain continuity of research and education programs and to hold the university's interest in supporting an off-site facility. As part of becoming the Station Director, Lauff negotiated funding for three faculty positions to be in residence at the Station year-round.

These first three faculty positions at the Station were in aquatic ecology as it was expected that having faculty with similar research interests would encourage collaboration, intellectual exchange and enhance graduate training. The diversity of aquatic habitats in the region was an attraction for field work. The three faculty hired in 1965 were Dr. Allen Knight (stream ecology), Dr. Donald McNaught (zooplankton ecology) and Dr. Robert Wetzel (algae and

Dr. George Lauff, the first year-round resident director of the Station (1964–1988). Lauff recruited the first resident faculty to KBS and oversaw a number of major expansions of KBS facilities funded by grants from the WKKF and National Science Foundation. PHOTO: MSU

The J.W. Stack building in the early 1970s. The Stack building was built in 1961 as part of a grant from the WKKF to update facilities at the Station. It provided classroom space for summer programs and research space for resident faculty until the Academic Building was constructed in the 1980s. PHOTO: KBS Archives

aquatic plants). They all held appointments in a MSU campus department, but taught and focused their research at KBS.

Lauff also encouraged and facilitated use of the Station's properties as research sites for campus-based faculty. Dr. John Cantlon in the Department of Botany and Plant Pathology established an experiment in 1964 to study what controlled changes in vegetation after an agricultural field is abandoned. The project was modeled after one established by Dr. Murray Buell, who had been Cantlon's Ph.D. advisor at Rutgers University. Entomologists also established research at the Station focusing on agricultural pests, particularly the cereal leaf beetle. Their work played an important role in developing biological control methods for insect pests.

Aerial photograph of the 18 experimental ponds at the Experimental Pond Laboratory built in 1971 with funding from the National Science Foundation. Later grants funded construction of a wet laboratory, storage buildings, renovations of the ponds, and improved computer connections. PHOTO: KBS

MSU's commitment to developing a strong research program at the Station included establishing a Hannah Endowed Professorship in Biological Sciences to be affiliated with the Station. The Hannah Professorships were established by the MSU Board of Trustees in 1966 to celebrate the 25th anniversary of John A. Hannah as President of MSU. In 1967, the WKKF provided $300,000 to MSU to establish an endowment for the John A. Hannah Professorship in Biological Sciences to recognize Kellogg's interest in biology. The endowment stipulated that this funding was "to assure continuing outstanding leadership in the biological fields" at MSU and "particularly in relation to the Experimental Forest and Biological Station."

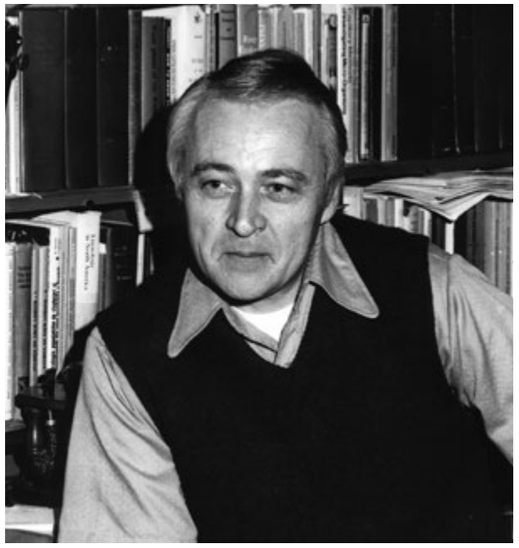
The first Hannah Chair affiliated with the Station was Dr. A.W.A. "Tony" Brown, an entomologist who came to MSU in 1971 to head the Pesticide Research Center. President Hannah had established this Center in response to concerns about DDT that arose following publication of Rachel Carson's *Silent Spring*. Brown was known for research showing that resistance to chemical pesticides, specifically DDT, was a major risk to food production and human health. While not based at KBS, Brown taught a graduate-level summer course "Ecology of Pesticides" at the Station for several years.

Lauff's interest in biological field stations led him to play an instrumental role in founding the Organization of Biological Field Stations (OBFS) and KBS was among the 34 charter member stations of OBFS in 1968. OBFS's goal is still "... to provide a forum for field station directors and managers to advance biological research, to solve common problems, and to determine how to best use field facilities for scientific study and development of educational and research approaches." An important outcome of establishing the OBFS was the development of the Field Stations and Marine Laboratories (FSML) program at the National Science Foundation (NSF), which funds improvements at field stations and marine laboratories to support research and education. This program has been an important source of funding to upgrade KBS facilities throughout its history.

Though McNaught and Knight left KBS after just a few years for positions at other institutions, Wetzel continued as a resident faculty member for over 20 years. Soon after coming to MSU, Wetzel selected Lawrence Lake as a primary research site. Lawrence Lake is a 12-acre lake that is relatively deep (42 feet) for its size, and is located within the Augusta Creek watershed, just 5 miles from the Station. Lawrence Lake became among the most intensively studied lake systems in the world, and research done by Wetzel and his students there was highlighted in his book *Limnology,* first published in 1975. Wetzel left KBS for a faculty position at the University of Michigan (1986) and later moved to endowed chairs at the University of Alabama and the University of North Carolina, where he worked until his 2005 passing.

Dr. Kenneth Cummins, a stream ecologist interested in insects and their role in stream food webs, was hired in 1968 with a joint appointment in Entomology. Cummins came from the University of Pittsburgh, where he had worked at its field station, the Pymatuning Laboratory of

Dr. Robert Wetzel, KBS faculty from 1965 to 1986. Wetzel brought expertise in algae and aquatic plants to the Station and established a year-round monitoring program at nearby Lawrence Lake. PHOTO: KBS Archives



Ecology. That same year, Dr. Donald J. Hall was recruited from Cornell University to KBS with a joint appointment in Zoology. While at Cornell, Hall had conducted research using experimental ponds with Dr. William Cooper, an MSU Zoology faculty member. After coming to KBS, Hall, Cooper and Lauff, along with Cooper's graduate student Earl Werner, submitted a proposal to the NSF to construct experimental ponds at KBS. According to Hall, the NSF was reluctant to fund this proposal, because it typically did not support brick-and-mortar projects. Hall credits Lauff with convincing NSF to fund this project by arguing that the ponds would function as "large, dirty test tubes" for experiments on fish and freshwater ecosystems. The NSF funding supported construction of 18 experimental ponds and a research lab in 1971. Later grants funded construction of storage buildings, a wet chemistry lab, improved computer connections and pond renovations that together are known as the Experimental Pond Laboratory.

Dr. Donald J. Hall and students sampling fish from Wintergreen Lake, at the Kellogg Bird Sanctuary. Hall was resident faculty at KBS (1968–1972) and continued to conduct research and teach at KBS in the summer after he moved to the main campus in East Lansing. PHOTO: KBS Archives

In 1971, Dr. Michael Klug joined the Station faculty with a joint appointment in the Department of Microbiology and Public Health (now Microbiology and Molecular Genetics). Klug developed a collaboration with Cummins on food webs in Augusta Creek at the Kellogg Forest. Cummins focused on invertebrates and Klug on microbes important to decomposition of leaves and other organic material in streams. Later, Dr. Richard Merritt, an aquatic entomologist in MSU's Department of Entomology, joined this team and developed research on stream insects. He also taught stream ecology at KBS for decades.

Cummins left KBS in 1978 for a faculty position at Oregon State, but continued collaborations with MSU colleagues and others that ultimately led to the development of the "River Continuum Concept." The "River Continuum Concept" focuses on how the factors that control stream invertebrate communities and aquatic productivity vary across a continuum of small streams to large rivers and strengthen connections between aquatic and terrestrial habitats. It continues to be an important principle guiding research on rivers and streams, especially in studies

Dr. Michael Klug and Dr. Kenneth Cummins sampling an artificial stream created in the Estate's original greenhouse to support experimental studies on stream insect communities. The stream facility was removed in the early 1970s. PHOTO: KBS Archives

Hall credits Lauff with convincing NSF to fund the experimental pond project by arguing that the ponds would function as "large, dirty test tubes" for experiments on fish and freshwater ecosystems.

aimed at addressing environmental problems in streams and rivers around the globe.

Klug also collaborated with Wetzel and Dr. James Tiedje, a microbial ecologist on the main campus, in examining how microbes and aquatic plants interact in oxygen-free aquatic sediments and how microbes influence nutrient cycles. Klug worked in a variety of systems that lacked oxygen, including marine and freshwater sediments and termite guts. Klug's collaborations with campus faculty members were important in developing the MSU Center for Microbial Ecology, an NSF-funded Science and Technology Center established in 1989. He also played a leadership role in establishing the KBS Long-Term Ecological Research (LTER) project, part of an NSF-supported network of research sites across the United States.

Dr. Michael Klug, KBS faculty (1971–2005) and director (1994–2004), entering a small submarine designed to sample sediments on the bottom of Lake Michigan. PHOTO: KBS Archives

PHOTO TO RIGHT: *Winkler bottles with water samples taken as part of the Gull Lake project in the late 1960s. The Winkler method for determining dissolved oxygen levels in freshwater was developed in the late 1880s. The samples shown here indicate that oxygen declined to near zero (white) by 15 m.* PHOTO: KBS Archives

McNaught and Lauff's work on Gull Lake in the late 1960s identified factors affecting water quality and the abundance of zooplankton, small crustaceans that provide food for fish. This work drew the attention of a group of women, known as the "Ladies of the Lake", who were concerned about declining water quality of Gull Lake. They asked Lauff to investigate what might be causing this problem. Lauff and his graduate student, David Tague, along with other researchers at KBS, including Dr. Brian Moss from the University of East Anglia, in England, showed that Gull Lake's declining water quality was primarily due to phosphorus pollution coming from septic systems surrounding the lake.

These findings mobilized the community to form the Gull Lake Quality Organization (GLQO) in 1977. The GLQO led efforts to educate local residents about causes of declining water quality in Gull Lake and to gain funding for construction of a sewer system to address this problem. The sewer system was completed in 1984 and subsequent lake monitoring showed reduced phosphorus levels and increased numbers of several fish species. Articles in the Kalamazoo Gazette describing this

project, noted the important role KBS scientists had played in conducting research to support the GLQO's grassroots effort. The partnership between KBS and GLQO continues today and has expanded to include understanding how changing land use around lakes can affect water quality and the monitoring of invasive aquatic species.

In 1973, Dr. Earl Werner was hired to replace Hall, who had shifted his appointment to campus. Hall continued teaching summer courses and conducting research at KBS throughout his career,

Jeffrey White, then a graduate student in Fisheries and Wildlife at MSU, sampling zooplankton as part of a project monitoring the effects of zebra mussels on Gull Lake in 2011, funded in part by the Gull Lake Quality Organization. PHOTO: KBS

"Crew" after setting up a pond experiment (~1979) at the KBS Experimental Pond Laboratory. Pictured from left to right: Gary Mittelbach (then graduate student, later KBS faculty), Dr. Donald Hall, Dr. Earl Werner, and Jim Gilliam (graduate student; later faculty at North Carolina State University). PHOTO: KBS

much of it in collaboration with Werner. Werner and Hall's work focused on the integration of theory with experimental and field studies to understand the abundance of different fish species in freshwater lakes. Their work played a major role in transitioning community ecology from a descriptive to an experimental science. Much of this research took place in local lakes and at the Experimental Pond Laboratory.

While terrestrial ecology was not initially a major focus of KBS research, the hiring of Dr. Patricia Werner in 1973 brought that expertise to the KBS faculty. Werner had been a graduate student of Cantlon's and did her Ph.D. research on European teasel (*Dipsacus sylvestris*) in the

KBS graduate students, Casey Huckins and Andy Turner, setting up a pond experiment in 1992. Huckins is now a professor at Michigan Tech and Turner at Clarion University, Pennsylvania. PHOTO: KBS

old-field succession experiments he established at KBS. Werner collaborated with Hal Caswell, a colleague at the Woods Hole Oceanographic Institute, to develop stage-based models of population growth based on data from her work with teasel. She also developed research on old-field succession that laid the groundwork for long-term research on plant communities at KBS.

By the mid-1970s, it was clear that there was a need for enhanced coordination and connections between KBS and campus to expand the Station's research and education programs. In 1975, the MSU Board of Trustees approved changes in the administrative structure of KBS to promote this. This included formally combining three separate units — the Bird Sanctuary, Farm and Gull Lake Laboratory — into the W.K. Kellogg Biological Station. They also placed KBS under the joint administration of the colleges of Natural Science and Agriculture and Natural Resources.

These administrative changes created an associate dean position at KBS held by Dr. Jacob Hoefer, then the Associate Director for MSU's Agriculture Experimental Station (now MSU AgBioResearch). Hoefer was the KBS administrative lead, reporting to deans of both colleges. Dr. Gordon Guyer, future MSU President, was appointed Associate Director for Agriculture Programs. Lauff was named Associate Director for Academic Programs and was the only one of the administrative team based at KBS.

Following this administrative change, Lauff and the KBS resident faculty (Wetzel, Klug, and Earl and Pat Werner) worked on several

Dr. Patricia Werner with teasel plant, the focus of her early research at KBS. Werner was the first plant ecology and woman faculty member at KBS (1973 – 1985).
PHOTO: Michigan State University Archives and Historical Collections

MSU's commitment to developing a strong research program at the Station included establishing a Hannah Endowed Professorship in Biological Sciences to be affiliated with the Station.

grants to enhance KBS facilities. In 1977, these efforts resulted in KBS being designated as an Experimental Ecological Reserve (EER) making it eligible for facility grants from NSF. In 1978, KBS was awarded a major facilities grant through the NSF EER program to improve labs and support opportunities for non-resident researchers to work at KBS.

At the same time, KBS was developing a proposal to the WKKF to expand agriculture education and outreach programs. The Rural Resources Education (RRE) grant was developed jointly by KBS and campus administrators and had ambitious goals for education and outreach programs in agriculture at KBS. The grant included training undergraduate students and others from non-farming backgrounds to pursue careers in agriculture and related industries. It primarily focused on small farming operations and was intended to increase public understanding of the important role of agriculture in southwest Michigan's economy and to promote development of new employment opportunities in agriculture. The WKKF expected that these education and outreach programs would be supported by expansions in agricultural research at KBS.

In 1980, the WKKF approved the $10 million RRE grant to MSU. The grant included funding for new facilities at KBS to support the broad range of education and outreach programs that were proposed and to enhance research facilities at the Station. This included construction of the Academic Building with an auditorium, library, research laboratories, faculty and administrative offices, and meeting rooms. It also funded renovations to the Stack Building to create classrooms and construction of the Orchard Dormitories. A new dairy barn and administration building at the Farm and the Farm Learning Center, were also built as part of this grant.

The new facilities strengthened connections between KBS and campus departments that were important for the expansion of research, education, and outreach programs in sustainable agriculture and land use management at KBS. This included a new collaboration between KBS and MSU Extension, to create the KBS Land and Water Unit. The goal of this unit was to share results of research done at KBS and other units of MSU on farming and land use to promote better management practices and enhance public

Dr. George Lauff with Dr. Bernie Knezek, then associate director for agricultural programs, and Warren Millett, KBS financial manager, reviewing plans for new construction at the Station funded by the WKKF Rural Resources Education grant in 1980. PHOTO: KBS Archives

The Academic Building of the Kellogg Biological Station was built as part of the Rural Resources Education project funded by the WKKF to house administrative offices, library, auditorium, meeting rooms and faculty research laboratories.
PHOTO: KBS

understanding of the interactions between aquatic and terrestrial systems. While the Land and Water Unit no longer operates at KBS, outreach and Extension programs focused on these issues continue at KBS today.

Soon after the RRE grant was funded, Earl Werner and Wetzel left KBS for faculty positions at the University of Michigan, and Pat Werner took a research position with the Tropical Ecosystems Research Center (TERC), part of Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO).

The departure of three senior faculty from KBS prompted MSU Provost C.L. Winder to form a committee to review the Station's mission and determine what was needed to support and expand its research, education and outreach programs. John Cantlon chaired what came to be known as the "Green Ribbon Committee." Having served as Provost and Vice President for Research and Graduate Studies at MSU and done research at KBS, Cantlon had a good understanding of and important perspective on the Station's value to MSU.

The "Green Ribbon Committee" was charged with developing recommendations as how the University could "... sustain and expand its (KBS') basic research efforts and effectively integrate research to include knowledge developed in biological and as well as agricultural sciences." The report was completed in July 1986, and while brief, it confirmed that KBS' mission was "... to develop programs in research, education and extension directed toward a comprehensive understanding of the interdependence of natural and managed terrestrial and aquatic systems, and the conservation of natural resources." The committee recommended returning to an administrative structure with a resident director, who reported directly to the deans of the colleges of Natural Science (CNS, now NatSci) and Agriculture and Natural Resources (CANR). They also recommended expansion of the resident faculty expertise to include the biology of agricultural and natural resource systems, in addition to three positions in aquatic ecology that the provost had agreed to support.

Also in 1986, KBS and campus faculty began collaborating on a proposal to NSF to establish a Long-Term Ecological Research (LTER) site at KBS, focused on the ecology of agricultural systems that would develop greater integration of ecological and agricultural sciences. Dr. G. Philip Robertson, a visiting assistant professor at KBS worked with Dr. Peter Groffman (a postdoc in Tiedje's lab), Klug, and Dr. Eldor Paul, Chair of the Department of Plant and Soil Sciences to develop the KBS LTER proposal. The goal of the proposal

Dr. G. Philip Robertson, KBS faculty since 1988, led the development of the Long-Term Ecological Research project at KBS and served as the project director from 1988 to 2016. In 2005, Robertson was named a University Distinguished Professor. PHOTO: MSU Communications

was "... to identify the key ecological interactions that regulate productivity in agricultural systems and to gain sufficient understanding of these interactions to design resource efficient farms and environmentally sound agricultural systems." The proposal was funded, and in 1987, KBS joined the national LTER network.

Over the next five years, the KBS faculty grew as a result of the recommendations of the "Green Ribbon Committee" and the provost to grow the research expertise of the resident faculty. These hires included a behavioral ecologist (Dr. Thomas Getty), three aquatic ecologists (Drs. Alan Tessier, Gary Mittelbach, and Lars Hedin), two plant evolutionary biologists (Drs. Susan Kalisz and Steve Tonsor), a plant community ecologist (Dr. Katherine Gross), and an agricultural ecosystems

ecologist (Dr. G. Philip Robertson). Robertson's position included responsibility for directing the KBS LTER. All were hired as assistant professors, and except for Robertson, had joint appointment in departments in the College of Natural Science. Robertson had a joint appointments in the Department of Crop and Soil Sciences in the College of Agriculture and Natural Resources.

Concurrent with this growth of the KBS faculty was the development of the Ecology and Evolutionary Biology (EEB, now Ecology, Evolutionary Biology and Behavior) led by Dr. Guy Bush, a Hannah Chair affiliated with KBS, Don Hall, Kalisz and Tonsor. The newly hired KBS faculty played a key role in the development and instruction of the core courses in the EEB program. EEBB is now a nationally ranked program and has played an important role in graduate training at KBS.

After a career that spanned more than three decades at KBS, George Lauff retired as director in 1989. Following a national search, Dr. Patrick Webber, an alpine plant ecologist who at the time was a Division Director at the NSF, was named

Dr. Gary Mittelbach, KBS faculty 1987 to 2018, taught Population and Community Ecology, one of the core courses in the EEBB graduate program for over 30 years. In 2017, he received the Beal Distinguished Faculty award in recognition of his teaching and research accomplishments. PHOTO: MSU Communications

Water levels in temporary and permanent ponds at the Lux Arbor Reserve have been monitored since 1996 to document how climate change is impacting these ponds. Pictured here is Vanessa Reis, a graduate student from Australia, who worked with Dr. Steve Hamilton, who established this project. PHOTO: KBS

KBS Director. While Webber's tenure was short (1990–1993), he helped initiate an NSF-funded graduate training program at KBS and oversaw the acquisition of the lands in nearby Barry County that became the Lux Arbor Reserve (LAR).

Dr. Richard Light and his wife Irmgard donated the land for the LAR to MSU in 1991 with the intent that it support education and research programs of KBS. The Reserve is located approximately 10 miles from the KBS facilities on Gull Lake and the over 1500 acres included a diversity of aquatic and terrestrial habitats. Light had used the property as a hunting reserve and was interested in preserving habitats that were representative of the area, including hardwood forests, conifer plantations, abandoned fields, agricultural land, wetlands, and temporary and permanent ponds. The property also included shoreline along Middle and Lower Crooked lakes. The diverse habitats of LAR created unique opportunities for research by KBS and other faculty.

The growth of KBS faculty and research programs made clear the need for more opportunities to support graduate students based at the Station. In 1992, the faculty, led by Mittelbach, developed a proposal to NSF for a Research Training Grant (RTG) focused on "Linking Levels of Organization" that reflected

In 1998, Dr. Thomas Getty, established a long-term study of house wrens at the Lux Arbor Reserve. Pictured here is his Ph.D. student, Cara Krieg, showing nestlings to K-12 teachers participating in a workshop. PHOTO: KBS

the wide scientific expertise of the faculty. The RTG outlined a program to provide graduate students with a strong foundation in ecology and evolutionary biology and opportunities to apply this knowledge to real-world problems. It also provided students the opportunity to learn how to communicate their research to a broader audience. The RTG laid the groundwork for several subsequent grants focused on K-12 teachers developed in collaboration with faculty in the Department of Teacher Education at MSU. These grants, led by Robertson and Getty, funded graduate students to work directly with K-12 teachers and their students, were the foundation of the KBS K-12 Partnership that continues today.

Following Webber's move to a faculty position on MSU's main campus, Klug was appointed KBS Director in 1994. Shortly thereafter, Dr. Stephen Hamilton, an ecosystem ecologist interested in interactions between aquatic and terrestrial systems, was hired to replace Hedin who had left for a position at Cornell. In 1995, Kalisz and Tonsor left for positions at the University of Pittsburgh where Tonsor would also be Director of the Pymatuning Laboratory of Ecology. Soon thereafter, Dr. Jeffrey Conner, an evolutionary biologist then at the University of Illinois, was recruited to a faculty position at KBS.

In 2001, Dr. Douglas Schemske, a plant evolutionary biologist at the University of Washington, was hired to be the Hannah Chair affiliated with KBS. Though based on campus (Plant Biology and

Dr. Jeffrey Conner with Sigrid Smith, then Ph.D. student at the University of Illinois, in a summer field course in Advanced Field Ecology and Evolution in 2004. PHOTO: KBS

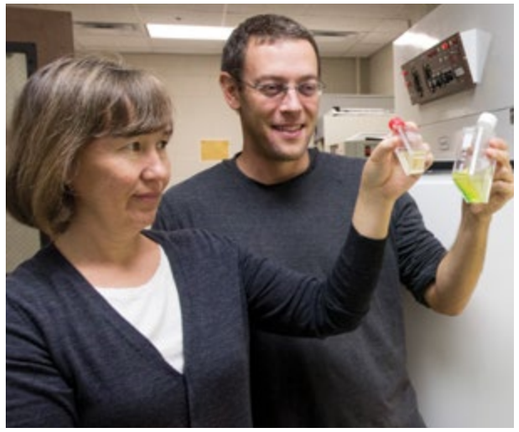
Horticulture), Schemske established a research program at KBS and collaborated extensively with KBS faculty. He also invested in the construction of a fenced deer-proof area (known affectionately as "Fort Schemske") with irrigation and shade cloth at the Plant Ecology Field Lab that supported his research and also that of other KBS and campus-based faculty. Prior to his retirement in 2017, Schemske was named to the National Academy of Sciences, one of the highest honors an American scientist can receive.

During Klug's tenure as KBS Director, faculty at KBS and MSU's College of Education developed several programs to provide professional development for K-12 teachers and unique learning experiences for gifted high school students. Funding for these programs came from grants from the WKKF and NSF, several of which included fellowship funding for graduate students. Klug also was instrumental in a proposal to the WKKF to restore the historical buildings of the Kellogg Estate: the Manor House, Carriage House, Caretaker's Cottage, and Boat House. In 2000, the restored Manor House was reopened to the public and today serves as a site to share Kellogg's commitment to people and the environment. It also provides a beautiful site for business meetings, training workshops, celebrations and philanthropic activities that support KBS and MSU.

After a KBS career spanning over 30 years, Mike Klug retired as KBS Director and the faculty, and Kay Gross became KBS Interim Director in 2004. Klug's retirement left a gap in KBS' expertise in microbial ecology and connections to campus, particularly the MSU Center for Microbial Ecology. Alan Tessier also left KBS for a permanent position at the NSF. The deans agreed to replace these positions at KBS and to support a new faculty position that would bring expertise in cropping systems ecology to KBS. They also agreed to have a national search for a new director. It was a challenging to have four ongoing searches for faculty positions at the same time,

PHOTO TO LEFT: *Dr. Steve Hamilton showing teachers participating in a K-12 Partnership workshop how to sample insects and other invertebrates that occur in ponds at the Lux Arbor Reserve.* PHOTO: KBS

PHOTO TO RIGHT: *Teachers taking gas samples from an old-field as part of a K-12 Partnership workshop.* PHOTO: KBS



Drs. Elena Litchman and Chris Klausmeier examining algae samples growing in their lab. In recognition of their diverse and numerous research contributions, Litchman and Klausmeier were named MSU Foundation Professors in 2017. PHOTO: KBS

but also exciting to have the opportunity to add new research expertise to the KBS faculty.

The faculty hired in these searches included Drs. Christopher Klausmeier and Elena Litchman, both aquatic ecologists at Georgia Tech who also had expertise in mathematical and theoretical ecology. Dr. Jay Lennon was hired to the microbial ecology position and brought expertise in statistical and genomic tools for analyzing microbial community diversity to KBS.

Dr. Sieglinde Snapp, an associate professor in the Department of Crop and Soil Sciences at MSU, who worked on cropping systems in Africa was hired to fill the cropping systems ecologist position. At KBS, Snapp took over a research program in sustainable agriculture, The Living Field Lab (LFL) which was established by Dr. Richard Harwood, MSU's first Mott Chair in Sustainable Agriculture. The LFL was developed to translate basic science learned on the LTER to practices that could be adopted by farmers. In 2015, Snapp returned to full time campus appointment so that she could better pursue her research on cropping systems in Africa.

Gross was selected as KBS Director in 2005 and in recognition of the need to further strengthen plant ecology at KBS, CNS Dean Leroi agreed to fund an additional faculty position to maintain

During Klug's tenure as KBS Director, faculty at KBS and MSU's College of Education developed several programs to provide professional development for K-12 teachers and unique learning experiences for gifted high school students.

Dr. Katherine Gross, KBS Director (2004–2018) and faculty (1987–2020), in the gardens of the Kellogg Manor House. Gross was named a University Distinguished Professor in 2005. PHOTO: MSU Communications

the Station's strength in this area. Dr. Jennifer Lau, a plant evolutionary ecologist was hired in 2007, and developed research on rapid evolution between plants and nitrogen-fixing bacteria using long-term experiments established by Gross on the LTER. She also established a large-scale experiment on restoration of native prairies in collaboration with Dr. Lars Brudvig (Department of Plant Biology), and Dr. Emily Grman (Eastern Michigan University).

Two new projects initiated in 2008 expanded the portfolio of research on sustainable agriculture at KBS. One, funded by the U.S. Department of Energy, focused on bioenergy crops, is a collaboration between MSU, the University of Wisconsin–Madison and several other institutions, and created the Great Lakes Bioenergy Research Center (GLBRC). A large field experiment paralleling that of the LTER was established at KBS to evaluate the environmental benefits and costs of different bioenergy crops. Robertson and Hamilton played key roles in establishing the GLBRC and integrating this project with the KBS LTER.

Also in 2008, the WKKF approved a large grant to MSU focused on revitalizing rural communities that included funding to convert the Kellogg Farm's conventional dairy to a pasture-based system using automatic (robotic) milking systems. MSU funded two faculty to be based at KBS in conjunction with this project. Dr. Santiago

Dr. Jennifer Lau, KBS faculty from 2007 to 2018, led the establishment of the Conservation Lands Experiment at KBS. Initial funding for this project came from a Michigan Department of Natural Resources grant, submitted by KBS Physical Plant and Farm staff to create habitat for upland game birds. PHOTO: KBS

Overview of the Great Lakes Bioenergy Research plots at KBS (facing west) with Gull Lake in the background showing the diversity of treatments in the GLBRC and the surrounding landscapes. PHOTO: KBS

Utsumi, a grazing ecologist, was at KBS from 2009 to 2018 and Dr. Diana Stuart, a sociologist, was on the KBS faculty from 2010 to 2015 before leaving for a faculty position at Northern Arizona. While their time at KBS was brief, their research increased involvement of Extension educators with KBS programs and provided experience in interdisciplinary research for graduate students.

Two faculty have been hired at KBS through an initiative at MSU to strengthen research in water sciences. Dr. Sarah Evans, a microbial ecologist was hired in 2013 and has developed research affiliated with the LTER and GLBRC on how microbes respond to short- and long-term drought. Dr. Bruno Basso was hired in 2012 jointly with the Geology Department (now Earth and Environmental Sciences). Through his expertise in crop modeling and the use of drones to characterize agricultural landscapes, he has made important contributions to the GLBRC and LTER research at KBS.

More recent faculty hires have strengthened research on the role of landscape fragmentation on species conservation. Dr. Sarah Fitzpatrick, a conservation geneticist, was hired in 2017 and conducts research on evolutionary consequences of habitat fragmentation in fish, amphibians and reptiles. Dr. Nick Haddad also was hired in 2017 as part of the MSU Global Impact Initiative. He brings expertise and a passion for butterfly conservation to KBS and his experience in managing large projects has prepared him to take on leadership of the LTER.

During Gross' tenure as KBS Director (2004–2018), the resident faculty nearly doubled (from 7 to 13) and connections to campus departments and the local community were strengthened. The integration of research and education has always been an important focus of KBS, and Gross was successful in increasing funding from the MSU Graduate School for student fellowships and establishing new endowments to support both graduate and undergraduate research and education at KBS. She also established "ELME" (Enhancing Linkages between Math and Ecology), a summer program that brings faculty to KBS to teach short courses in mathematical and statistical ecology and developed partnerships with campus to expand learning experiences for MSU undergrads at KBS.

Dr. Santiago Utsumi, KBS faculty in grazing ecology (2009–2018) with MSU Extension Specialist, Dr. Kim Cassida (background), leading a Grazing School for farmers at the Kellogg Farm in 2014. PHOTO: KBS

To strengthen connections to the community, Gross established a Director's Advisory Board (DAB) in 2006. Board members support KBS in many ways and serve as ambassadors to the community. Several DAB members have established new endowments at KBS that fund fellowships for undergraduate and graduate students and enhance facilities at the Sanctuary and

Students in the summer 2015 Ecology course at KBS pictured during a field trip to Otis Lake, Barry County State Game Area. The proximity to diverse habitats, field experiences and small class size continues to attract MSU students to KBS summer courses. PHOTO: KBS

Attendees of the spring 2016 KBS "Dessert with Discussion" public seminar. This program was originally funded by a grant from the WKKF and continues today as an important outreach program of KBS with funding from donors. PHOTO: KBS

Manor House. In addition, Gross was successful in obtaining a $1 million gift from the WKKF to establish an endowment for the Manor House and Estate that was matched by over $500,000 in contributions from community members. The Manor House endowment ensures the continued maintenance of the historic buildings on the Kellogg Estate and supports student interns who do projects that help share the Kellogg legacy.

A signature program that Gross initiated soon after becoming director, "Dessert with Discussion," has been important in strengthening connections to the community. The program brings MSU faculty to KBS to present their research in an informal evening presentation accompanied by desserts prepared by the KBS Conference Center. Originally funded by a grant from WKKF, "Dessert with Discussion" will be sustained with funding from an endowment established to honor Gross' retirement as director and commitment to community outreach.

In August 2018, Gross retired as KBS Director and Jeff Conner was appointed Interim Director. Also in 2018, Mittelbach retired from the KBS faculty after more than 30 years of service, and Lau moved to a faculty position at Indiana University. These changes, along with Schemske's retirement as Hannah Chair and Getty's move to be Chair of Integrative Biology, have reduced the number of faculty at KBS. But these changes can create opportunities to expand research at KBS into new areas. If the past is any predictor of the future, we can expect that the legacy of excellence that has developed at KBS over the past 90+ years, will continue. And the visions of Kellogg, Stack, Morofsky and others to integrate research, education and outreach into world-renowned programs will be sustained and expanded into new directions.

EPILOGUE

Dr. Katherine (Kay) Gross
KBS Director 2004–2018; KBS faculty 1987–2020

Few — maybe no one — would have imagined that W.K. Kellogg's gift of the Bird Sanctuary and Farm, and later the W.K. Kellogg Foundation's donation of the Eagle Heights Estate, to Michigan State College of Agriculture and Applied Science would create a world-renowned center of excellence for research, education and outreach in ecology and evolutionary biology. But it did! It was due in part to the wisdom of Kellogg who, when deeding his properties to MSC, included the expectation that they would be used to serve the citizens of Michigan into the future by supporting education and research on environmental issues. But it grew over time because of the commitment of directors, staff, faculty and students to fulfilling this vision and working to keep this relevant to changing times.

The Farm and Sanctuary's first supervisors and managers knew Kellogg and his passion for education, so it is not surprising that early initiatives at the Station focused on programs for teachers. Today, educational programs at KBS have grown well beyond the School of Biology that Dr. Walter Morofsky and Joseph Stack established in the 1930s. Summer field courses

Students, faculty and staff gather for lunch on the McCrary dining hall deck on warm summer days. The public is also welcome for lunch at McCrary. PHOTO: KBS

are still an important part of KBS' academic program and the commitment to teacher training continues through the K-12 Partnership. This program provides workshops and research experiences for over 100 teachers every year, introducing them to tools that broaden their

Aerial view of the KBS academic complex on Gull Lake in the early 1980s, showing the Academic-Stack research and education center and historical buildings built as part of W.K. Kellogg's summer home, Eagle Heights, in the 1920s. PHOTO: KBS Archives

students' understanding of science and aligns with national standards. It is fitting that the original research building at KBS is named for Stack and the library for Morofsky, as their visions to integrate the Station's research and educational programs are central to KBS' 21st century mission.

Much has changed in the 90-plus years since Kellogg made those early investments, but the challenge to conduct research and translate findings into programs that, as Kellogg stated in the Farm trust agreement, "... serve as an object lesson to the people in the region ..." continues to guide the mission of KBS today. The integration of basic ecology and evolutionary biology into research on agricultural systems is providing foundational knowledge on sustainability and conservation that will help transform management practices around the world.

Some things have come full circle. The Guernsey herd Kellogg originally established at the Farm nearly a century ago was pasture-based. Today the KBS Pasture Dairy Center has an integrated grazing system and cows that are milked by robots. A very different system, but the Farm's focus is still on supporting research and working with MSU Extension to share information on new technologies and tools that can be incorporated by farmers into management. This includes a partnership with the MSU Dairy Store to produce unique and delicious cheese from the 'pasture-fed' cows at KBS. These cheeses are frequently served at special events across the Station and are sold year-round at the Bird Sanctuary.

The Sanctuary continues to be a center for public outreach and education about research done at KBS. The image of the Trumpeter Swan at the Sanctuary entrance celebrates the important work done by Joe Johnson and others to re-establish this magnificent bird in the Midwest. Yet few visitors know that the Sanctuary was originally established to preserve the Canada goose. In the 1920s, this bird was on the verge of extinction in North America, and Sanctuary staff worked with conservationists across the country to ensure its survival: a success that far exceeded expectations. But this provided the

Holstein cows grazing on pastures of the Kellogg Farm. A grant from the W.K. Kellogg Foundation funded the conversion of the traditional dairy facility at the Kellogg Farm to a pasture-based system in 2008. PHOTO: KBS

Credit for transforming the Kellogg Station from a sleepy little biological station in southwest Michigan to a center for research excellence must acknowledge the vision and commitment of Dr. George Lauff.

Trumpeter swans flying over Wintergreen Lake of the Kellogg Bird Sanctuary. PHOTO: Rick Viel

framework for conservation efforts at the Sanctuary that resulted in the successful restoration of the Trumpeter Swan to the upper Midwest.

Credit for transforming the Kellogg Station from a sleepy little biological station in southwest Michigan to a center for research excellence must acknowledge the vision and commitment of Dr. George Lauff, the first resident director. His insistence on establishing a resident faculty at the Station to provide continuity in the educational and research programs differentiates KBS from other biological field stations. The faculty has grown in diversity and number since Lauff first hired three aquatic ecologists. Aquatic ecology is still an important aspect of KBS research and educational programs, due to the diversity of habitats available nearby, but has expanded to include a variety of terrestrial systems, including agricultural lands.

KBS research continues to be cutting edge both in the questions asked and technologies used. The mix of agricultural and unmanaged

lands that surround KBS, together with large research experiments focused on row-crops, bioenergy production, and grazing, provides platforms for research and unique locations for teaching and outreach. A new molecular genomics lab at KBS supports research linking ecological and evolutionary processes that provides important new insights into the management and conservation of species in a changing world.

Generations of graduate and undergraduate students have had transformational learning experiences at KBS. Many of them continue to do research or teach, while others have gone on to careers in policy, management and related fields that were motivated by their KBS experiences. Alumni demonstrate their commitment to continuing the Station's legacy by sending their students here for courses, research and internship experiences, and making financial contributions to enhance these programs.

Interest and engagement of the local community in KBS programs continues to grow. Public programs like "Dessert with Discussion," along with informal and formal outreach at the

Students from the 2006 ROKS (Residential Opportunities at the Kellogg Station) program sampling vegetation on Middle Crooked Lake, Lux Arbor Reserve. The ROKS program was a semester-long 'study away' program at KBS from 2006 to 2010. PHOTO: KBS

Farm and Sanctuary are designed to highlight MSU and KBS research. Many visitors also come to enjoy the beauty of the Manor House and Estate grounds. Brides and grooms who choose the Manor House for their wedding venue may not know about the research and educational programs going on in the fields, waters or buildings around them, but everyone who works at the Station is dedicated to stewarding the gifts of Kellogg and the WKKF to give visitors and guests a special experience.

The commitment of everyone who works at KBS — as well as those at MSU and in the community who continue to support the people and programs here — will ensure that the vision that led to the Station's establishment continues for future generations. The W.K. Kellogg Biological Station's record of outstanding research, unique educational experiences, and commitment to public outreach enhances the reputation and capacity of MSU to address environmental issues important to people in Michigan and around the world. As an external reviewer of KBS stated in 2017, "If KBS didn't exist, people would be thinking of ways to invent it."

The W.K. Kellogg Biological Station's record of outstanding research, unique educational experiences, and commitment to public outreach enhances the reputation and capacity of MSU to address environmental issues important to people in Michigan and around the world. As an external reviewer of KBS stated in 2017, "If KBS didn't exist, people would be thinking of ways to invent it."

The Kellogg Manor House decorated for the annual KBS Holiday Walk. PHOTO: KBS

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