Two Apollo programs

Dr. Philip B. Duffy, President & Executive Director

It is often said that we need an “Apollo program” to develop new renewable energy technologies. I don’t agree, for reasons that I’ll outline below. We do need an Apollo program, though—in fact we need two—but not for that purpose. (For those under the age of 60, the Apollo Program resulted from John F. Kennedy’s call to “land a man on the moon and return him safely to earth.” The program succeeded because of a massive marshaling of research, resources, and political focus.)

We don’t need a crash program to develop new renewable energy technologies because we already have technologies that are perfectly good, especially wind and solar. These have the potential to produce vastly more energy than we’ll ever need, and their cost has dropped precipitously, to the point that they are now competitive with fossil fuels in many markets. The cost of solar, for example, has fallen by 80% since 2009. The other reason we don’t need this kind of Apollo program is that it is probably too late for any yet-to-be-developed technology to save us from the worst consequences of climate change. For a new technology to be conceived, financed, researched, tested, commercialized and deployed at scale, would take probably 50 years or more. If we are going to prevent unacceptable levels of climate change, we’ll need to be largely done with shifting from fossil fuels to renewables before then. So any new technologies will most likely comprise the second generation of renewables. Those are important, too, but don’t need to be developed on an emergency basis.

The Apollo program we do need for renewable energy is to massively deploy the technologies we already have. This is especially true in the developing world, where energy needs will grow much faster than elsewhere due to rapid increases in both population and per capita income. It’s essential that these needs be met using renewable technologies rather than fossil fuels. This needs to start immediately, too, because once fossil-fuel infrastructure is built there’s a strong tendency to want to use it until it wears out (a phenomenon known as “infrastructure lock-in”). It’s also important to focus exclusively on technologies that are truly low-carbon. Many forms of bioenergy, for example, are not much better than fossil fuels in terms of life-cycle carbon dioxide (CO₂) emissions. That’s not good enough to fix climate change, which is why WHRC has recently been vocal in opposing policies that would promote these non-solutions.

The second Apollo program we need is one to remove massive amounts of CO₂ from the atmosphere. This is needed because it’s too late to control climate change.

APOLLO continued on next page...
Dr. Christopher Neill joins the staff of WHRC

On July 1 WHRC welcomed its newest staff member, Senior Scientist Christopher Neill, a world-renowned expert on terrestrial ecosystems. Dr. Neill comes to WHRC from the Marine Biological Laboratory (MBL) Ecosystems Center, where he began working in 1991 and was named its director in 2013. He is also former Director of the Brown University-MBL Partnership and Brown-MBL Graduate Program in Biological and Environmental Sciences and a professor of Ecology and Evolutionary Biology at Brown.

Since 2007, Dr. Neill has worked closely with WHRC scientists in Mato Grosso, Brazil, at Tanguro Ranch, the research station where WHRC conducts studies of land-use change in the Amazon.

“As a long-time collaborator and colleague of Chris’s, I am excited to have him join the WHRC team,” said Senior Scientist Michael Coe, coordinator of the Amazon group. “His vast experience in the Amazon and on local projects, his reputation as a scientist and researcher, and his enthusiasm for our work will be a true asset, not only to the Amazon program and to the Center, but to the Falmouth community and our work around the globe.”

Dr. Neill also oversees the laboratory chemical analysis for the “Baywatchers” project that monitors the water quality of Buzzards Bay, as well as the Boston region sampling for a nationwide study on how suburbanization is homogenizing the ecological structure and function of ecosystems across the US. He said that he was drawn to WHRC by the combination of long-term studies of ecosystem change on the ground, large-scale spatial analysis, and numerical modeling that draws these studies together.

“You would be missing key understanding of ecological change if you only looked at very large scale changes from satellites, or if you only did plot studies that determine mechanisms in one place,” said Dr. Neill. “Linking both these approaches is critical. That is why I wanted to join WHRC. My interest is to develop this cross-scale approach science and to be a part of that array of talents within one group. And it is happening at Woods Hole Research Center. WHRC is a global center for that kind of science.”

“Chris brings not only world-class research chops, but also a contagious enthusiasm for the process of scientific discovery and communication,” said Assistant Scientist Marcia Macedo. “We’re lucky to have him.”

APOLLO continued from front...

solely by reducing future emissions of greenhouse gases—there’s too much CO₂ in the atmosphere already for that to be sufficient. Our work (which has been corroborated elsewhere) shows that climate-smart land management could potentially remove very substantial quantities of CO₂ from the atmosphere by the time-honored process of photosynthesis. This potential is heartening, but the challenges are immense and the CO₂-removal problem needs new ideas (in both policy and science), as well as more resources focused on implementation. We are excited to be applying our own research and tools to break down these barriers and bring this concept to implementation, along with partners like The Nature Conservancy and the World Bank.

So there’s a lot to do, and huge consequences if we fail, but I am proud that WHRC is addressing some of the most important challenges we face today. We can’t do this, of course, without the continued support of our many friends. Thanks as always for your help.

WHRC named world’s top climate think tank for 3rd straight year

At the end of June, WHRC was awarded the number one ranking among the world’s climate change think tanks for the third year in a row by the International Center for Climate Governance (ICCG).

The Climate Think Tank Ranking for 2015 is the “authoritative … assessment of the most cutting-edge institutions working in the field of climate change economics and policy,” according to the ICCG, which bases the ranking on an institution’s activities, publications and dissemination (thinktankmap.org/newsdetails.aspx?id=72).

Congratulating the staff in an email, President Phil Duffy wrote, “The award is an enormous testimony to your talent and determination, and I am exceedingly proud of you in earning this achievement.”
Diversity partnership students receive biomass training at WHRC

Last month, 14 students from the Woods Hole Partnership Education Program (PEP) spent a day at WHRC learning how to measure aboveground biomass. Associate Scientist Alessandro Baccini led the classroom portion of the day, while Research Associate Kathleen Savage supervised actual measurements. Climbing through the woods and dense undergrowth behind the Woodwell Building, teams of students wrapped measuring tape around tree trunks and called out results to their colleagues.

PEP, which was launched in 2009, is a collaborative effort among Woods Hole’s six scientific institutions (WHRC, Woods Hole Oceanographic Institution, Marine Biological Laboratory, Sea Education Association, USGS and NOAA-Fisheries) to increase diversity in the environmental sciences. PEP brings college students from historically underrepresented groups to Woods Hole for a summer program entitled “Ocean and Environmental Sciences: Global Climate Change.” The four-week course is followed by six weeks of internship with Woods Hole scientists.

“It was an amazing learning experience,” said Liomari Diaz-Martinez, an environmental biology major from the University of Texas-Arlington, of the biomass course. “The hands-on learning about the assessment of aboveground biomass gave me insight towards the reality of field work.” Ms. Diaz-Martinez will spend her internship working with Ms. Savage at WHRC.

This spring, when the energy-efficient George M. Woodwell Building reached its 13th year of existence, it was time to review the energy systems and see how they stood up against what was originally planned. At the same time, the Center for Coastal Studies established the Cape Cod Climate Change Collaborative (CCCC), a Cape-wide campaign to unite the varied expertise and experience of Cape Cod organizations to address the impacts of climate change (coastalstudies.org/cccc).

The CCCC statement of purpose reads in part, “The challenge for the Collaborative is to spur local and regional actions to mitigate these impacts by linking available knowledge, talent and tools of Cape Cod organizations.” The goals of the initiative are, among others, to “reduce dependence on fossil fuels and reduce the carbon footprint of local organizations.”

At WHRC’s Ordway Campus, there is no burning of fossil fuels, and reducing the WHRC carbon footprint has always been a central facet. The goal of a carbon-neutral campus was originally set by WHRC Founder George M. Woodwell when the first building opened in 2003, but it was sidelined due to the unforeseen growth of vast computing needs, legacy problems with the heating/cooling system, and the addition of a second building, the Carriage House. Strategies to get back on track will include energy monitoring, exploring the cloud and other more efficient computing options, and the installation of a PV solar system on the Carriage House roof. The latter, however, will depend on the generosity of donors.

The easiest of these three strategies and one that is already underway is energy monitoring. In 2003, a robust energy monitoring device was in place. Over the years however, this system needed software, database maintenance, and upgrades as system components aged. Eventually, that system ceased to produce usable data. But in March of this year, the decision was made to replace the old system with a state-of-the-art eGauge device (egauge.net). This new device is currently monitoring our existing PV solar system production, total Woodwell Building usage, Woodwell Building HVAC usage, and total server room usage. Although it will eventually take a few eGauge devices for us to reach complete monitoring of all energy parameters between both buildings, the new system vastly enhances our energy data stream and produces a data record over 1000 times per second.

WHRC staffers are proud to show visitors the campus and the real-time energy display (whrc.org/energy-display). Not only are high-quality energy production data necessary for receiving renewable energy credits (RECs) in the state of Massachusetts, they are also helpful for making big facility decisions. For example, at various times it is helpful to know how well the HVAC system is performing, just how much energy the server room uses, or how the cost of powering that facility compares to transferring to the cloud. As the old adage goes, “you can't manage what you don’t measure.”

To arrange a tour of the WHRC Ordway Campus, visit whrc.org/about-whrc/environmentally-friendly-campus.
WHRC scientists study effects of arctic fire in Yukon

Last month, a team of eight researchers traveled to the Yukon Delta National Wildlife Refuge in western Alaska to study the effects of an expansive 2015 fire in the tundra. Led by WHRC scientists Max Holmes, Sue Natali, and Distinguished Visiting Scientist John Schade, the team got a close look at vegetation, permafrost, water chemistry and greenhouse gas fluxes from tundra, lakes, streams, ponds, and wetlands, taking samples from both burned and unburned areas. Permafrost, which contains vast amounts of carbon, underlies this entire region and is predicted to be largely thawed by the end of the century.

The team traveled via float plane and helicopter and camped for ten days at remote locations in the Yukon-Kuskokwim Delta. Historically, fires were not common in the tundra, but with the warming climate, fires have been increasing, and in 2015 more area burned in the Yukon-Kuskokwim Delta (>700 km) than in the previous 65 years combined. As Max Holmes said, “2015 was a truly crazy year for fires in the tundra, but it was the first time I had tried to do research while camping. We had sunny days and rainy days. We had 30 mph windy days and completely still days with clouds of mosquitos. And always, everyone was positive and excited to be there. We collected more samples than we thought we could. We fell into easy rhythms and teased each other as only people who have spent 24/7 with each other can do. I feel like I am only just beginning to know this landscape, and I left with so many more questions about the ecosystem than I had when I arrived. I can’t wait to return. (Read more of Ludda’s journal entry at whrc.org/field-notes.)

The team was also impressed by the great variety of breeding birds, including the majestic sandhill crane. Each day loud choruses of cranes awakened the group in the wee hours of the morning.

Over the summer and fall, the water and soil samples gathered during the trip will be analyzed at WHRC. Field work for this project will continue in September, when Drs. Holmes and Natali will return to the YK Delta to make additional measurements during the late summer period of maximum thaw. Funding for the research comes primarily from a grant from the National Science Foundation’s Arctic System Science Program. Philanthropic support has provided key additional resources, including from the Ruth McCormick Tankersley Charitable Trust.

Next month, we will be catching up with Dr. Natali and another team of researchers, who have set off again for field work in far eastern Siberia.

WHRC in the news

Forest Fires Can Heat Up the Whole Planet (bit.ly/1dwL5sk). A National Geographic article about the work of the major ABoVE project, led by Senior Scientist Scott Goetz, noted the conditions and effects of fire in the boreal regions and the ongoing research of WHRC’s Brendan Rogers and Scott Goetz. 24 June.

ABoVE and beyond the call of duty: the value of a great field team (go.nasa.gov/29E0GWJ). On NASA’s Notes from the Field webpage, WHRC’s Brendan Rogers extolled his research team following their recent trip to Saskatchewan to study the effects of fire. 24 June.

Why we should all worry about the Amazon catching on fire this year (wapo.st/29U8PcK) ran in The Washington Post, citing the work of WHRC scientists Paulo Brando and Marcia Macedo. The story also quotes WHRC Board member, Dr. Thomas E. Lovejoy. 12 July.
Last month WHRC received two major arctic research awards from the National Science Foundation (NSF). Both projects will be led by Senior Scientist R. Max Holmes. The Arctic Great Rivers Observatory is a collaborative project which began in 2002 to study the chemical discharges of six major arctic rivers. The latest award from NSF’s Arctic Observing Network program will allow that work to continue by more closely examining changes in panarctic river discharge and chemistry, which can be powerful indicators of the effects of climate change on these large watersheds. The project includes scientists from the University of Texas, the University of New Hampshire, Florida State University, the University of Calgary, and elsewhere.

The second NSF grant is for Polaris-Yukon, which builds on two previous Polaris projects that provided undergraduate and graduate students the opportunity to be involved in hands-on science in the Siberian Arctic. The work of Polaris-Yukon will take place in the Alaska’s Yukon River Delta and focus on “changing the face of arctic science” by engaging visiting faculty and undergraduate students who thus far have had little involvement in this area of study.

As well as Dr. Holmes, the investigators include WHRC’s Dr. Susan Natali, who stated that Polaris-Yukon will “advance our vision of diversifying the arctic research community by engaging a diverse group of undergraduate students in cutting-edge arctic research and then providing them the encouragement, mentoring, and opportunities to continue along their paths leading to careers as arctic researchers.”

Four WHRC scientists contributed to the new book, Climate Change in Wildlands: Pioneering Approaches to Science and Management (islandpress.org/book/climate-change-in-wildlands). The book represents the culmination of NASA’s five-year Landscape Climate Change Vulnerability Project. It examines how climate and land use changes affect mountain landscapes of the Rockies and the Appalachians, and how these findings can be applied to wildlands everywhere.

Three of the book’s chapters were co-authored by Assistant Scientist Brendan Rogers and Deputy Director Scott Goetz, while another included co-author Research Associate Tina Cormier. Research Associate Patrick Jantz was lead author on a chapter discussing climate impacts on the vegetation of Eastern US national parks, as well as contributing author of four other chapters.

“Climate change is likely to make a tough job even tougher for natural resources managers,” said Dr. Jantz. “So I am thrilled that we could contribute to this book that provides a roadmap for integrating climate change into natural resource management plans and strategies.”

Prior to joining the EPA, Ms. McCabe held several leadership positions in the Indiana Department of Environmental Management’s Office of Air Quality and served as Massachusetts’ assistant attorney general for environmental protection and assistant secretary for environmental impact review. She is a graduate of Harvard College and Harvard Law School.

“Janet McCabe’s leadership has been invaluable in the Obama administration’s response to climate change,” says WHRC President Phil Duffy. “She has been at the heart of some of the fiercest recent battles on this issue, but seems to have lost none of her optimism or humanity.”

Please make advance reservations by email to: rsvp@whrc.org
WHRC summer film series continues

**Dam Nation**
Thursday, August 11 at 5:30 pm
This powerful film journey across America explores the sea change in our national attitude from pride in big dams as engineering wonders to the growing awareness that our own future is bound to the life and health of our rivers. *Q & A follows with Senior Scientist Max Holmes.*

**A Fierce Green Fire**
Saturday, September 10 at 4:30 pm
Inspired by the book of the same name by Philip Shabecoff, this documentary is the first big-picture exploration of the environmental movement and chronicles grassroots and global activism spanning 50 years, from conservation to climate change. It brings together all the major parts of environmentalism and connects them. *Q & A follows with President Phil Duffy.*

Films will be shown in WHRC’s Harbourton Auditorium and begin promptly at the times listed. Due to limited seating, reservations are highly recommended.

A half-hour wine and cheese social will precede each film screening. All are welcome to come early for refreshments and conversation.

RSVP by email: events@whrc.org or for more information visit whrc.org/summer-film-series-2016.