

National Agricultural Research, Extension, Education, and Economics (NAREEE)  
Advisory Board

**MINUTES OF THE NATIONAL GENETIC RESOURCES  
ADVISORY COMMITTEE MEETING**

November 9-10, 2015  
Aquatic Germplasm and Genetic Resources Center, Louisiana State University  
2288 Gourrier Ave, Baton Rouge, LA 70820

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Respectfully submitted,

\_\_\_\_\_  
Dr. Manjit Misra  
Chair

\_\_\_\_\_  
Michele Esch  
Executive Director

APPROVAL BY ADVISORY BOARD:

\_\_\_\_\_  
Date

\_\_\_\_\_  
Initials  
Chair

\_\_\_\_\_  
Initials  
Executive Director

## Executive Summary

The National Genetic Resources Advisory Committee (NGRAC), a statutory committee of the National Agricultural Research, Extension, Education, and Economics (NAREEE) Advisory Board, met in public session on November 9-10, 2015, in Baton Rouge, LA. The main goal of the meeting was to discuss cross-cutting issues related to genebanks, plant breeding, tribal concerns, and recommendations for promoting useful diversity in plant, animal, insect, microbe, and aquatic genetic resources. Louisiana State University's (LSU) Aquatic Germplasm and Genetic Resources Center (AGGRC) hosted the meeting and collaborates with outside partners both in the public and private sectors. The Center makes ongoing offices, equipment, and laboratory space available for "cooperators" and is renovating more of the LSU center to support genetic resource programs and storage.

USDA Chief Scientist Dr. Woteki provided an update on recent appropriations and budget agreements but said it was unclear how they would impact USDA. Dr. Woteki said the new Foundation for Food and Agriculture Research has received strong interest and while the foundation is not accepting applications for funding at this time, it is geared toward supporting partnerships and matching fund opportunities to investigate emerging problems and develop rapid responses.

Dr. Geoff Waldbeiser of USDA ARS said that the aquacultural industry (farmed fish) is struggling to meet demand. Globally, consumption of farmed fish exceeded beef consumption in 2010. The U.S. imports 90% of its seafood. Salmon and catfish are farmed in the U. S. ARS has 25 projects, 55 scientists, 9 laboratory sites, and a \$34 million budget for research on fresh and saltwater fish focused on solving producer challenges including selective breeding. In addition to low rates of safety inspection, another challenge is that about 1/3 of international fish supplies are mislabeled as more expensive species when brought to market. LSU's Dr. Terry Tiersch added that the USDA's Germplasm Resources Information Network (GRIN) is an important tool for managing information on animal germplasm. He advocated expanding the repository for aquatic germplasm noting that aquatic genetic resources could evolve into an industry rivaling that of the \$1 billion cattle semen industry. Tiersch claimed that managing fish genetic resources—not fish flesh—is where the U.S. has opportunities to grow.

Dr. Stephen Smith discussed the need to maintain "useful diversity" in crop gene pools. He noted that single-gene resistance to disease will ultimately break down and thus requires monitoring of pathogen pressure and resistance. Biological interactions are inevitable and should be managed and monitored to protect against pests, diseases, and other environmental factors. USDA's Dr. Peter Bretting said a template for crop vulnerability statements has been developed that the Crop Germplasm Committees (CGCs) are using to identify potential problems. The NGRAC discussed how some companies' concerns with Intellectual Property Rights (IPRs) can challenge public scientists' efforts to conduct genetic profiling to monitor and maintain crop diversity.

NGRAC agreed to communicate to the CGCs that it is actively interested in their vulnerability assessments. NGRAC recommends more engagement between public and private sector entities to address how IPRs and other obstacles may be preventing the genetic diversity assessments and monitoring necessary to enhance useful genetic diversity.

Terry Williams presented tribal concerns with genetic diversity and environmental issues. Decision-makers need to protect genetic resources, germplasm, and promote seed-saving at all levels of government, he said. Leslie Wheelock, director of the Office of Tribal Relations at USDA, underscored the Departments' efforts to protect, save, and support the cultural heritage of tribes. She noted that the U.S. Forest Service is the only government organization that has a mandate to protect land sites with tribal significance and she is working to extend the mandate to all government agencies that oversee lands. NGRAC is very receptive to incorporating tribal concerns about genetics of salmon, plants, herbs, foods, and grasses important to tribes in its deliberations. Measurement programs for management review and evaluation could be useful as many recovery efforts are falling short of the "no net loss" criteria of the Endangered Species Act, according to tribal officials.

## **RESOLUTIONS AND RECOMMENDATIONS**

- NGRAC Chair Dr. Manjit Misra summarized several suggestions for tangible actions which arose from the discussion, including: the development of a USDA resource guide could be recommended; facilitation of intertribal communications could be advanced, and centers of excellence could be established for plant breeding and seed systems. He also thanked outgoing NGRAC members Drs. Warren and Snow.
- NGRAC agreed to communicate to the CGCs that it is actively interested in their vulnerability assessments whether for maize, cotton, or horticultural crops all of which will be updated by the CGCs in the near future. NGRAC recommends that more engagement between public and private sector entities be pursued to enhance useful diversity and address Intellectual Property Rights that restrict public scientists from conducting research on the genetic diversity of crop genetic resources.

## **ACTION ITEMS**

- NGRAC will develop a letter and recommendations based on the minutes of this meeting. This letter will be reviewed by the NAREEE Advisory Board and, once approved, forwarded to the Secretary of Agriculture.
- Dr. Michael Schechtman will connect Terry Williams with a tribal liaison through NAREEE DFO Michele Esch.
- Dr. Peter Bretting agreed to communicate to the CGCs that NGRAC is actively interested in their vulnerability assessments whether for maize, cotton, or horticultural crops all of which will be updated by the CGCs in the near future.
- NAREEE support staff will begin planning the next NGRAC meeting which will be held in Griffin, GA April 18 or 25, 2016.

## **SUMMARY OF PRESENTATIONS**

The meeting included presentations from tribal organizations, hosts, USDA's chief scientist, other USDA officials and scientists, and tours of a USDA honeybee breeding and genetics laboratory. The meeting was held at the Aquatic Germplasm and Genetic Resources Center (AGGRC) at Louisiana State University (LSU). The meeting included a tour of current research, laboratories, and displays at LSU's AGGRC. Several presentations were given at the meeting on animal genetics and the Livestock Conservancy. All presentations are available from the NAREEE Advisory Board Office.

### **Welcome and Introduction of Members**

Michele Esch, Executive Director, started the meeting and introduced host Dr. Terry Tiersch of LSU's AGGRC who welcomed the panel and discussed how the AGGRC collaborates with outside partners both in the public and private sectors. The Center makes ongoing office and laboratory space available for "cooperators" and is expanding the LSU center to support genetic resources programs and germplasm storage.

Terry Williams of the Tulalip Tribe in the Pacific Northwest discussed the importance of genetic resources to tribes nationwide and outlined his experience in addressing the critical nexus between environmental issues and preserving genetic diversity. Subsistence, cultural, and other tribal needs are met through ensuring the preservation of wild plants, animals, fish, and birds.

Dr. Timothy Johnson of Seed Savers Exchange described the activities of that nonprofit organization, now in its 40<sup>th</sup> year. Seed Savers preserves heirloom seeds and serves as a germplasm repository of over 20,000 samples of trees, tubers, and over 4,500 varieties.

Dr. Manjit Misra (chair) thanked outgoing NGRAC members Drs. Warren and Snow and then introduced USDA Chief Scientist Dr. Catherine Woteki who briefed members by teleconference.

### **Comments from REE Leadership**

Dr. Woteki provided an update on recent congressional appropriations and budget agreements but said it was unclear how they would impact USDA. She noted that an omnibus appropriations bill is likely and said the Department is spending carefully because of the possibility of a Continuing Resolution which keeps expenditures flat. Dr. Woteki said the new Foundation for Food and Agriculture Research has received strong interest and has hired Sally Rockey as its executive director who started in September 2015. While the foundation is not applications for funding applications at this time, it is geared towards investigating emerging problems and developing rapid responses to those problems. The foundation also is interested in partnering with other organizations to match its funds and address new challenges.

### **Part I: Livestock, Aquatic Species, and Honeybee Genetics**

Dr. Harvey Blackburn joined the group by phone at 8:45 a.m. He said USDA had saved the cattle industry \$2.2 million in genotyping costs as USDA had a key sample of an Angus bull industry was

seeking. He added that 2 of 3 calves are sired by top bulls, illustrating the value of genetic resources programs which now surpasses the \$1 billion mark in the cattle industry. He suggested that an array of technical and reproductive characteristics could be lost if conservation of diversity is not a priority.

Discussants asked if society is at a transition point where developing new ways to view and use genetic resources is becoming critical in light of the contraction of diversity in some animals and plants. Concerns were raised about germplasm of wild species and herd assisted migration related to climate impacts.

### **Aquaculture Genetic Efforts in ARS**

Dr. Geoff Waldbieser of USDA ARS joined via phone and outlined recent aquaculture efforts, noting that the aquacultural (farmed fish) industry is struggling to meet demand. World consumption of farmed fish began exceeding beef consumption in 2010. The U.S. imports 90% of its seafood. Salmon and catfish are farmed here. The more tropical Tilapia fish is not addressed by ARS and is heavily farmed in South America and China. ARS has 25 projects, 55 scientists, 9 laboratory sites, and a \$34 million budget for fresh and saltwater fish research focused on solving producer problems. Technical challenges related to selective breeding may prevent some producers from improving stocks. Recent efforts involve mating male blue catfish with female channel catfish which results in hardier hybrid breeds. Other challenges are that about 1/3 of international fish are labeled at market as other, more expensive species. In addition, there are low rates of safety inspection for imported fish.

### **LSU Aquatic Activities Presentation and AGGRC Tour**

Dr. Terry Tiersch of LSU led a tour of the AGGRC including its aquatic holding tanks, laboratory equipment, cleaning process, and mobile units. He said the USDA's Germplasm Resources Information Network (GRIN) is an important tool for collecting information on germplasms. He advocated expanding the repository for aquatic germplasm noting that cattle germplasm (sperm) business is now a \$1 billion industry. Fish farmers are just beginning to leverage these techniques now but the field lacks standardization and other key templates, norms, and universal methods even as it expands. Biodiversity is key to prevent disease, especially in shrimp. Tiersch forecast that managing fish genetic resources—not fish flesh—is where the U.S. has an opportunity to grow. AGGRC's mission is reproduction and repository development—both basic and applied research on a commercial scale. The lab contains fish tanks, 3D printers, office space and other resources to support germplasm research and storage. He noted that reliance on zebrafish as a test species is growing because they are cheaper to house, evaluate, and study than other test animals like mice and rats. He welcomed opportunities for AGGRC to partner with USDA and other organizations to advance the science of identifying and preserving aquatic species' genetic resources. Dr. Geoff Waldbieser added that having Blue Catfish sperm stored in “French straws” that AGGRC uses was a “game changer” compared with practices employed 5 years ago.

### **Honey Bee Breeding, Genetics, & Physiology Presentation and Tour**

Dr. Robert Danka of the USDA ARS Bee laboratory in Baton Rouge—standing in for Dr. Thomas Rinderer—gave a tour of the center's pollinator health program and research. NGRAC members observed the study of mites in honeycombs that are threats to populations, received briefings on

molecular genetic markers, and saw the operations of the research center. This included fertilization procedures and processing. Dr. Danka noted that their requirement to save honey from the test hives in large drums sometimes complicates the ARS laboratory's research focus.

### **Animal Genetics Conservation**

Dr. Alison Martin, interim executive director of The Livestock Conservancy (TLC) discussed its *in-situ* philosophy for preserving rare animals on farms. The Conservancy does a census, stays in touch with breeders, provides technical support, and protects rare breeds. Rare breeds are classified as critical, threatened, watched, or recovering by the Conservancy, which can use cryopreservation techniques in its conservation efforts. The Navajo Churro sheep almost became extinct before TLC became involved, she said. TLC receives about 15-20% of its funding from memberships and the rest from grants, foundations, and corporate sponsors.

## **Part II: Crop Genetic Vulnerability**

### **Genetic Diversity: Avoiding Genetic Vulnerability**

Dr. Stephen Smith discussed the need to maintain “useful diversity” in gene pools. Dr. Jane Dever and Matthew Dillon contributed to the presentation. He noted that single-gene resistance to disease will ultimately break down and thus requires monitoring of pathogen pressure and resistance. Biological interactions are inevitable and should be managed and monitored to protect against pests, diseases, and other environmental factors. Dr. Smith said that private sector entities are under pressure from investors for short-term solutions which may or may not coincide with the best way to maintain diversity in genetic resources. He believes public sector breeding capacity is key and that it should be carefully stewarded and managed. Dr. Smith added that the promise of “gene editing” might be exaggerated, as some proponents suggest it removes the need for maintaining germplasm. He concluded by noting that there are both short- and long-term issues to be addressed. Dr. Matthew Dillon agreed, noting that a diversity of decision-makers and funding sources is valuable. NGRAC discussed whether a proposed methodology is warranted to help genetic diversity weather epidemics, biotic stressors, and climate change. Both food security and taxpayer-funded crop insurance are at stake, suggesting that a role for government is warranted.

Dr. Peter Bretting said a template for crop genetic vulnerability had been developed that the Crop Germplasm Committees (CGCs) are using to identify potential vulnerabilities resulting from too narrow a genetic base. The NGRAC discussed how some companies' concerns with Intellectual Property Rights (IPRs) can challenge public scientists' efforts to conduct genetic profiling to monitor and maintain crop diversity by impeding germplasm exchanges. Dr. Bretting said the CGCs are trying to update their vulnerability assessments regularly instead of updating static documents at infrequent intervals.

NGRAC agreed to communicate to the CGCs that it is actively interested in their vulnerability assessments whether for maize, cotton, or horticultural crops, all of which will be updated by the CGCs in the near future. NGRAC plans to encourage engagement between public and private sector entities to address IPRs, and the need to enhance useful diversity.

### **Public Comment**

During the public comment period no individuals expressed a wish to make comments.

### **Part III: Cross Cutting Issues**

#### **Overview of Cross-Cutting Issues: Tribal Concerns**

Terry Williams and Preston Hardison represent the Tulalip tribe in the Pacific Northwest and presented tribal concerns with genetic diversity and environmental issues. Tribal governance holds a unique position among environmental and agricultural agencies given that treaties protect water, fish, wildlife, and plant resources for cultural use on tribal lands. The courts have upheld tribal access to these resources allowing the Tulalip and Canada, for example, to co-manage Northwest fisheries. The presenters discussed rising sea levels, the loss of half of Snohomish glacier, and the need for resilience plans. Decision-makers need to protect genetic resources, germplasm, and promote seed-saving at all levels of government, they said. Tribes' "kincentricity" means that relationships with the natural world are embedded in ecological and spiritual webs of kinship with mutual obligations to other life forms that must be constantly renewed. Knowledge is collective in the tribe's cosmology and worldview even though not all knowledge is universally shared within a tribe. Some efforts to collect genetic information from tribes by outsiders have been met with distrust. For example, one member of a tribe reportedly said "they've taken everything else, now they're coming for our identity."

#### **USDA Efforts with Tribes/Genetic Resources**

Leslie Wheelock, director of the Office of Tribal Relations at USDA, joined the discussion by phone and underscored the departments' efforts to protect, save, and support the cultural heritage of tribes. She noted that the U.S. Forest Service is the only government organization that has a mandate to protect land sites. She is working to allow that to be expanded to all government agencies that oversee lands.

NGRAC stated that it is very receptive to incorporating tribal concerns about genetics of salmon, plants, herbs, foods, and grasses important to tribes in its deliberations. Other members stated that measurement programs for management review and evaluation could be useful as many wildlife and wild plant recovery efforts are falling short of the "no net loss" criteria of the Endangered Species Act.

Dr. Manjit Misra identified the main action items from the discussion, including: the development of a USDA resource guide could be recommended; facilitation of intertribal communications could be advanced, and centers of excellence could be established for plant breeding and seed systems.

#### **USDA Plant Breeding Activities**

Dr. Anne Marie Thro (Senior Advisor in USDA's Office of the Chief Scientist) reviewed a roadmap of USDA plant breeding activities emphasizing the human-aided development of plant cultivars with needed characteristics such as nutritional value and hardiness. She concluded that plant breeding needs a long term funding cycle to be effective. Members stated that traditional knowledge

can play a role in plant breeding and in responding to environmental challenges such as climate change.

## **Updates and Activities on the AC21**

Dr. Michael Schechtman (USDA Biotechnology Coordinator) joined by teleconference and said the AC21 conference linking biotech with 21<sup>st</sup> century agriculture is “back on,” subject to congressional funding. He updated NGRAC on other efforts and agreed to connect Terry Williams with a tribal liaison through NAREEE DFO Michele Esch.

## **Working Lunch—Continuous Improvement**

The NGRAC explored how it could be more effective. Perhaps meetings could be extended to two (2) full days without expanding the agenda, which would allow for more discussion time. NGRAC members praised USDA staff for the excellent logistical support they provided to committee members’ travel and meeting planning—an aspect of committee functioning they would like to see maintained. Other proposals for improvements and alternatives were debated and discussed.

The next NGRAC meeting will be held in Griffin, GA April 18 or 25, 2016, and will be hosted by outgoing ex-officio member Dr. Gary Pederson. Dr. Manjit Misra praised Dr. Pederson’s contributions to the panel and NGRAC quickly agreed to plan the next meeting in Griffin which is not far from Hartsfield International Airport in Atlanta, GA.

## **Meeting Adjournment 12:45 p.m.**

## **KEY ISSUES AND DISCUSSIONS**

### Recommendations from NGRAC FY2016

Dr. Manjit Misra said a number of suggestions of tangible actions came out of the discussion, including: the development of a USDA resource guide could be recommended; facilitation of intertribal communications could be advanced, and centers of excellence could be established for plant breeding and seed systems.

NGRAC agreed to formally communicate to the CGCs that it is actively interested in their vulnerability assessments whether for maize, cotton, or horticultural crops all of which will be updated by the CGCs in early 2016. NGRAC plans to encourage engagement between public and private sector entities to enhance useful diversity and address IPRs that restrict public scientists from genetic profiling and could be key in maintaining genetic diversity.

Dr. Terry Tiersch of the AGGRC welcomed opportunities to partner with USDA and other organizations to advance the science of identifying and preserving aquatic species’ genetic resources, an area he believes could be a growth opportunity for the nation.

### Communication and Coordination Needs

Dr. Michael Schectman agreed to connect Terry Williams with a tribal liaison through Michele Esch.

NGRAC plans to informally alert the CGCs that it is actively interested in their crop vulnerability assessments in anticipation of NAREEE's consideration of the NGRAC recommendation.

## **COUNCIL BUSINESS**

NGRAC will compose a letter, including recommendations, based on the minutes of this meeting for forwarding to the Secretary of Agriculture.

The next NGRAC meeting will be held in Griffin GA April 18 or 25, 2016.

## **RESOLUTIONS AND RECOMMENDATIONS**

- NGRAC Chair Dr. Manjit Misra summarized several suggestions for tangible actions which arose from the discussion, including: the development of a USDA resource guide could be recommended; facilitation of intertribal communications could be advanced, and centers of excellence could be established for plant breeding and seed systems.
- NGRAC agreed to communicate to the CGCs that it is actively interested in their vulnerability assessments whether for maize, cotton, or horticultural crops all of which will be updated by the CGCs in the near future. NGRAC recommends that more engagement between public and private sector entities be pursued to enhance useful diversity and address Intellectual Property Rights that restrict public scientists from conducting research on the genetic diversity of crop genetic resources.

## **ACTION ITEMS**

- NGRAC will develop a letter and recommendations based on the minutes of this meeting. This report will be reviewed by the NAREEE Advisory Board and, once approved, forwarded to the Secretary of Agriculture.
- Dr. Michael Schechtman will connect Terry Williams with a tribal liaison through NAREEE DFO Michele Esch.
- Dr. Peter Bretting agreed to informally communicate to the CGCs that NGRAC is actively interested in their vulnerability assessments whether for maize, cotton, or horticultural crops all of which will be updated by the CGCs in the near future. This will occur before NAREEE formally considers the recommendation that vulnerability assessments be carefully tracked by NGRAC and USDA pursuant to private and public sector engagements on IPRs and other potential obstacles to genetic profiling and the maintenance of genetic diversity.

## **APPENDIX A: LIST OF MEETING ATTENDEES**

A list of public attendees is available from the NAREEE Advisory Board Office.

### **Monday, November 9**

NGRAC Members and Ex-Officio Members Present: Dr Peter Bretting, Dr Jane Dever, Matthew Dillon, Dr Timothy Johnson, Dr Manjit Misra, Dr Karen Moldenhauer, Dr Gary Pederson, Dr Stephen Smith, Terry Williams, Dr Mulumebet Worku.

NGRAC Members and Ex-Officio Members Absent: Dr Frances Cordova, Dr Paul Gepts, Dr John Holdren, Dr Jeffery Schloss, Dr Sharlene Weatherwax.

NAREEE Advisory Board Staff: Michele Esch, Shirley Morgan-Jordan.

Other USDA Staff: Dr Harvey Blackburn, Dr Robert Danka, Dr Ann Marie Thro, Dr Geoff Waldbieser, Dr Catherine Woteki.

Invited Guests: Preston Hardison (Tulalip Tribe staff), Alison Martin (The Livestock Conservancy), Dr Terry Tiersch (LSU/AGGRC), Leticia Torres (LSU/AGGRC).

### **Tuesday, November 11**

NGRAC Members and Ex-Officio Members Present: Dr Peter Bretting, Dr Jane Dever, Matthew Dillon, Dr Timothy Johnson, Dr Manjit Misra, Dr Karen Moldenhauer, Dr Gary Pederson, Dr Stephen Smith, Terry Williams, Dr Mulumebet Worku.

NGRAC Members and Ex-Officio Members Absent: Dr Frances Cordova, Dr Paul Gepts, Dr John Holdren, Dr Jeffery Schloss, Dr Sharlene Weatherwax.

NAREEE Advisory Board Staff: Michele Esch, Shirley Morgan-Jordan.

Other USDA Staff: Dr Michael Schechtman, Dr Ann Marie Thro, Dr Geoff Waldbieser, Leslie Wheelock.

Invited Guests: Preston Hardison (Tulalip Tribe staff), Alison Martin (The Livestock Conservancy), Dr Terry Tiersch (LSU/AGGRC), Leticia Torres (LSU/AGGRC).

## **APPENDIX B: Presentations**

All presentations given at the NGRAC meeting are available from the NAREEE office upon request.