



Meeting Minutes

1.9.2020

January 9, 2020 • 10:00 am to 3:00 pm • MnDOT Training and Conference Center • Shoreview, MN

Present

- | | | |
|------------------------------|-------------------------------|---------------------------------|
| 1. Angelique Dahlberg | 12. Jack Greenlee (via phone) | 21. Megan Weber |
| 2. Angie Gupta | 13. Leech Lake (via phone) | 22. Missy Anderson |
| 3. Ariana Richardson | 14. Jennifer Burington | 23. Rob Venette |
| 4. Bob Dunning | 15. Jim Calkins | 24. Sonja Smerud (via phone) |
| 5. Byron Karns | 16. Katie Sickmann | 25. Jeanie Katovich |
| 6. Celie Borndal | 17. Katherine Wyman-Grothem | 26. Tyler Kasper |
| 7. Cori Mattke | 18. Kelly Pennington | 27. Val Cervenka |
| 8. Dane Huinker | 19. Kelsey Wenner | 28. Chelsey Blanke |
| 9. David Hanson | 20. Laura Van Riper | 29. Michael Smanski (presenter) |
| 10. Doug Jensen | | |
| 11. Forest Eidbo (via phone) | | |

Council Business

1. Review Agenda
 - a. Agenda **approved**.
2. Approval of Meeting Minutes from 10/16/2019
 - a. **Approved**.
3. Treasurer's Report
 - a. Income from field tour, expenses were seed money for UMISC to IPAW, fiscal administration and web, end of 2019 \$21,012.47
 - b. Treasurer's report **approved** as presented.
4. Leadership for 2020
 - a. Thanks Angelique Dahlberg, welcome Jennifer Burington
5. Upcoming Meeting Dates
 - a. Next meeting at the University of Minnesota St. Paul Campus Coffey Hall

Invited Speaker

Introduction to Genetic Biocontrol

Dr. Michael Smanski,
Assistant Professor of Biochemistry, University of Minnesota
smanski@umn.edu (612) 624-9752

- Genetic biocontrol is not all the same, there are many different types, with strengths and weaknesses of each
 - Physical control, chemical control, biological control:
 - Physical: Netting, trapping, fishing, etc
 - Chemical: Toxins, mating pheromones, attractants, etc
 - Biological control: Predators, pathogens, genetic biocontrol, etc
- Genome engineering methods
 - Classifying existing options for invasive species control
 - Self-limiting dilute or leave/die vs self-sustaining-spread in the environment, neutral allele in the middle
 - Sterile insect technique, low persistence, homing endonuclease gene eradication technologies more difficult to control

Introduction to different strategies for genetic biocontrol

- Genome engineering – transposon never leave the cell, evolve proteins. Insert genes randomly
- Integrases – molecular machine, find attachment site, integrate into genome, change how strong a gene is, when it turns on/off, landing pad to insert genes into the region
- Crispr – cheap and easy insertion directly into the gene, program the tool to cut anywhere in the genome, cell will either replace itself or tell it how to repair it
- TALEN – University of Minnesota, insert gene, change to genome anywhere you want
- **Main thing to know** heading towards a point that we could specify the sequence and change them at will, we don't have all the design info yet, but we have technology to do it

Most promising approaches, strengths and weaknesses

- Sterile insect technique – most successful approach to eradicate an insect to date
 - Mass rear an insect then sterilizes it
 - New World Screw worm successfully eradicated from North America. 50s started, now a permanent barrier at the Panama Canal, gamma radiation
 - Implementation cannot be applied to all insects, not feasible for mosquitos
- Precision guided sterile insect technique – Crispr protein component, g-RNA directs the scissors to the genome to cut a specific location, guide RNA to make females die and sterilize males
 - Pros – proven effective, public acceptance, non-persistent
 - Cons – not applicable to all insects, batch variability, less effective when males and females are dispersed together, males may not be as strong
- Homing gene drives
 - Homozygous with a wild – engineered and non-engineered, mate again with a wild, frequency of gene is diluted over time
 - Gene drive – affect behavior and can have a scissor to cut the wild allele/chromosome when in contact and make trans, mate heterozygote with wild to make 100% hetero, make a gene spread like wildfire
 - Homing gene drives: suppression vs replacement

- Replace Disease vectors – modified mosquito for disease control, immune to harboring virus
 - Suppress – put a gene in a gene drive, when all modified they die off because they need wild to reproduce
- Pros - easy to design and build, potentially very powerful, versatile
- Cons - poor public acceptance, genetic resistance – huge hurdle to get over, highly invasive
 - Approaches to decrease genetic resistance, models of how low 10 to the -20th power to ensure no genetic resistance
 - Hard to do field trials
- Question from group - Do they become super?
 - No, they don't. Random self-healing usually kills the gene, creates another version of the wild gene in another sequence. If there is resistance you could develop one to target the original drive.
 - Paper in news about a field trial of genetic control from Mexico taken to Brazil stating new genes become better offspring and could lead to a super insect. Six authors want it retracted. Experimental design was bad, no evidence of hybrid vigor, amount of Mexican DNA was decreasing over time and disappearing. It illustrates a potential failure. Subpopulation engineering to target specific areas.
- Self-limiting persist more than sterile insect technique
 - Bias sex ratio of offspring. Some genes in genome only turned on by sex, females control a toxin - female limited gene. Male engineered homozygous – offspring females die, males survive, mate with wild female – females die, males carry – stays in environment. Transformed gene lasts for many generations. Fitness defect that transformed gene dilutes out. Repeat releases, over time transformed gene would go away.
 - Aquatic species example: daughterless carp, extra gene, sex hormones all female go through males, aromatase converts male to female, express a gene that knocks out the aromatase to make a female, phenotypically make all males, no fitness defect by losing half of the offspring
 - Pros - Proven to work in field trials, allows for egg release – much easier to produce
 - Cons - slow dilution, still requires high release numbers, daughterless carp still unproven (weird results in carp)
- Underdominance Systems anytime a heterozygote has lower fitness than either homozygotes, extreme underdominance not viable
 - Reciprocal translocation is one way to do underdominance, moving arms of chromosomes, create imbalance, can be fitness defects, can use toxins/antitoxin underdominance
 - Extreme underdominance – engineered genetic incompatibility, certain genes only turned on at certain times or places, if a way to turn on genes in the wrong locations to cause death, target genes to express too high or in wrong spot, introduce an activator to mutate the space where it binds, if a wild type is found it becomes a target, modified are left alone
 - Underdominance as a threshold dependent gene drive – mate with same type can make offspring, mate with wild offspring die, if release threshold is met wild can die
 - Underdominance use it like a sterile release male – only going to find wild females, lab makes eggs, females die males survive, mate with wild female
 - We have it for fruit flies, moving to carp via zebra fish, moving to spotted wing drosophila

- Plant extreme underdominance – synthetic species, GMO crop containment, if a plant could not self-fertilize, plants are a challenge, form of reproduction is limiting, could try to engineer male plants and install them into the landscape.
- Zebra mussels, broadcast gametes all at once, right before broadcast – place males in there to release gametes and then remove them from the location. Mary Balser – sustain in a lab zebra mussel in Duluth. The attachment stage is lacking in lab.
- Public opinion synthetic species? “synthetic biology” term/field biology. Designing new functions in organisms. Cheap or knock off, bad connotation. Engineered biology is new name. engineered genetic incompatibility is what it is referred to. What words are used is very important.
- Question from group: What questions did you get at the State Fair? We asked more questions to get public opinion, survey at fair to change population of sample, no conversation before survey but many conversations continued after the survey was given. In general people are more accepting of physical control methods, then biological, chemical is least accepted control method. Potentially use of the word poison made people score chemical less. Biological control – genetic biocontrol was most accepted, release of pathogen slightly better than chemical, predators in middle. Sway is quite easy with short descriptions before questions.
- Question from group: Start a company to control mosquito – protection against involuntary search and seizure, private homeowner decides to keep breeding bad mosquitos, who needs to approve a widespread release. 99.9% buy in is it still ethical to do it if one group is completely against it. How do you decide when it is ok to do? Grey area, ethics.
- Group discussion: This technology is still rare. How long will it take to get to field testing? Spotted wing drosophila permit end of this year possible, technical hurdles. Carp much longer. Every new organism has unique biology to make models. Mice project, internal gestation in theory could engineer offspring to kill mother?
- Group question: Super bug? Are there papers that say they don’t become super. Bias in science, difficult to prove a negative. Any release is regulated, EPA & USDA, risk assessments look at environmental and human health, permit field trials.
- Group discussion: mosquito – bacterium incompatible with wild insects FDA approved it, central California, separate male and female mosquitos – google. Wabachia bacteria?
- Group discussion: Is this technology to remove a trait that is bad? Yes. Is it cancer? No, organs don’t develop properly not a growth. Incompatible with each other, compatible with wild, release v2 to be incompatible with v1, security for accidental release.

Engagement Discussions

- Update on species proposed for Rule-Making - Kelly Pennington (10 min)
 - Prohibited invasive species, need permit, jumping worm rule making is not done often
 - aquatic plants – common reed, yellow floating heart *least wanted list for Great Lakes – take regulatory action
 - fish – tench*, eastern mosquitofish (western is currently), tubenose gobies clarify all in genus *Proterorhinus*, tubenose goby current
 - Federal injurious wildlife list – Nile perch, snakehead fish family, walking catfish family, close gaps from LACI

- Invertebrates – jumping worms, golden freshwater clam, golden mussel*, marmorkreb or marbled crawfish*, federal injurious wildlife list – add mitten crabs. Chinese mitten crab in Lake Superior
 - Not yet proposed – 30-day comment period. MISAC will receive notice to comment
 - Expect any negative comments – non-native phragmites, permit until phase out
 - Corbicula – locations with known infestations, water used for nuclear plant in Welch
 - How does the regulation work – inform Nursery industry and soil movement industry – land clearing, nursery, homeowners
 - DNR list is prevent spread, MDA list has categories with control/sale
- Should MISAC push DNR to have another category between Prohibited and Regulated? Is there a fear that DNR could enforce the Prohibited list like MDA?
- Disbandment of the NISC Advisory Council – Missy Anderson
 - Chuck Bargeron will speak in April
- Potential engagement topics – MISAC goal, what do we want to engage on,
 - MDH – speaker but not member
 - Genetic biocontrol on website? A little could be helpful – in research or new information section

Updates and Discussion Topics

Any new goals for 2020? Potential speakers

- Customs and Border Patrol, reach out to Essam Dabaan
 - Pesticides
 - Don't Pack A Pest – Doug Jensen, USDA started it, stop researchers, students and travelers.
 - Chronic Wasting Disease & Avian Influenza
 - Ballast water Jeff Udd
- Logo revision/Brand standards – Dane Huinker & Megan Weber
 - No bar logo, trademarking the logo – TM official
- 2021 MISAC Calendar – Laura Van Riper
 - Topics ideas, voting will be online
- Website committee update – Missy Anderson
 - Research needs, calendar with meeting locations, Jennifer Burington's contact information
- Species ranking review update – Laura Van Riper
 - Final products – word document with methods and results, excel file with species name, link to current and former list
 - Finalize terrestrial plant team, review to all MISAC members
 - Online vote for approval to post
- UMISC Updates & Planning Oct 12-14 – Doug Jensen
 - Progress: behind but doing ok
 - Attendance 730 from 2018
 - Co-chairs: aquatic and terrestrial committees, priority topics
 - Committees: field trip, poster, exhibitors
 - Call for abstracts end of January, Mid-April deadline for abstracts
 - Chris Benson graphic design, new logo with oriental bittersweet
 - Sponsors and exhibitors
 - Moderators May
 - Program early June

- Long list of plenary speakers – general, research and management
- Claire has been good
- MISAC Finances – Dane Huinker & Missy Anderson
 - Agreement with Wildlife Forever
 - Play Clean Go contribution - \$300 previous
 - Forest will be giving an update at next meeting after discussion with NAISMA
 - Follow up with Dane about current Play Clean Go
- Carol Mortensen Award – Missy Anderson
 - Committee – volunteers and then nominations
Angelique Dahlberg – Chair, Laura Van Riper, Kelsey Wilmer, Missy Anderson, Bob Dunning
 - Former nominations are considered in voting

Timed Updates from Members

1. Forest Eidbo – No big updates
2. Jack Greenlee – Prepare contract for treatments
3. Sonja Smerud – No updates
4. Leech Lake – biocontrol of purple loosestrife – leech lake area request for locations of biocontrol
5. Bob Dunning – Bylaws, NOWAC what is a County Agriculture Inspector
6. Ariana Richardson – 2020 grant cycle, reassess where inspectors are, COLA seminars every season, distribute information
7. Angelique Dahlberg – research project USGS MAISRC zebra mussel populations, Lake Minnetonka low concentration to limit non targets, 2 bays treatment and control
8. Rob Venette –Jan 24 MITPPC, MAISRC & Water Resources Center hosting a Water Resources Assembly and Research Symposium, water quality and invasive species, North Star Ballroom on St. Paul campus, free, will send out a link. MITPPC 13 projects are launched – jumping worms treatment alternatives, phragmites remote sensing population detections, new MITPPC outreach materials distributed
9. Val Cervenka – forest health team is working on Oak Wilt control, USFS grant to control in St. Croix State Park, control on state lands along the border
10. Cori Mattke – Symposium, RFP Jan 2 for 2021 projects \$1.5 million
11. Tyler Kasper – grant work, thank you to partners for support letters, Aquatic: boat inspections over 500, interaction with 1000+ people, nine boat decontaminations, AIS surveys – 25 lakes, good season. Terrestrial: 95 acres of woody invasive species, 56 forbs species. Upcoming survey points for EAB from historic random points. Kelsey Fond du Lac partner on Chinese mystery snail.
12. Kelly Pennington – no updates
13. Chelsey Blanke – organisms and trade of invasive species, state plan subcommittee
14. Angie Gupta – workshops, manage at the edge of species, Forest Pest First Detector and Weed Them Out no sessions this season, Forecasting activity on Jan 31 about terrestrial invasive species on the St. Paul campus. UMN Extension guidance on common names principals. Monika Chandler received the Friends of Extension award for all her great work. EmpowerU coming to an end, curriculum is available and free, engage in natural resources (water & fire), Public Issues & Leadership Conference in DC.
15. Kelsey Wenner – annual taking care of the land in the community next Saturday at Black Bear casino. Chinese mystery snail is the focus this summer, hand picking weekly 500 pounds at accesses, find a location that the snails congregate to make removal easier, garden compost. Goats eat invasive species, no herbicides, copper sulfate treatment.

16. Doug Jensen – Sea Grant, Proposals – host Great Lakes Biotics with UMISC, 2014 Milwaukee, bait industry response, **Motion for executive committee to make a MISAC letter of support for the Great Lakes Biotics at UMISC– Approved.** June 14-15 Lake Superior Management plan, Chelsea up to speed in Great Lakes Region, St. Louis County AIS plan update. Honor Sooper Yooper – education programs for K-12 students, 800 schools learn about AIS, using many of the sea grant materials, potential collaboration. Summer undergraduate intern applications. Events Jan 15-16 Habitatitude at Northern Green Expo, outreach was provided at 100+ events, 20,000 people educated through partnerships
17. Katherine Wyman-Grothem – unwanted movement of species during activities, expand early detection and rapid response, 12 papers in Biological Invasions journal, moving the national agencies in a good direction
18. Jim Calkins – Northern Green Expo Noxious Weeds update, MNLA Board policies Noxious weeds and invasive species, growers in discussion
19. Dave Hanson – updated noxious weed list, new MNDOT weed book. Shorthanded in his department, job postings.
20. Byron Karns – staffing new chief of resource stewardship, open full-time biological science technicians aquatics, 3-4 seasonal biological technician staff terrestrial, engage five Conservation Corps Minnesota & Iowa crews, 6-8 tracks of high ecological value along river, prescribed burns (last 2017)
21. Katie Sickmann – reporting, highlights, 193 miles, Oriental bittersweet monitoring, hiring three interns, 2020 work plan
22. Celie Borndal – Ginger Kaup, new farm bill rewrite new rules, big change brush management and herbaceous weed control, 3 years of treatment for specific species, CRP Farm Services Agency program, marginal farmland into habitat, sign up want to be a high year
23. Laura Van Riper – DNR internal order IS, survey staff
24. Jeanie Katovich UMN – garlic mustard bio control weevil, submit petition for future approval for field release
25. Jennifer Burington – MDA updating Noxious Weed list, preparing for Gypsy Moth treatments in Spring, Elongate Hemlock scale response
26. Megan Weber – UMN workshops AIS detectors, professional track – same workshop includes hands on emergent ID, 3rd edition, 2nd edition in bookstore. Workshop locations – Arden Hills, Hennepin County, Grand Rapids, Duluth, and Alexandria. Workshop buy out, host private sessions – charge or not, up to 25 people, 15-17 people is the break-even point. Gathering Partners Conference – annual extension conference open RFP Two Harbors in May Superior Shores Resort. By Land and By Sea – ID guide best seller of the year, reprint or update
27. Missy Anderson – Three Rivers Park District Oriental bittersweet treatment, hire 2 seasonal staff