Twenty-Sixth Annual

Pi Mu Epsilon

Regional Undergraduate Math Conference

November 11-12, 2011

Featured Speaker: John Koker

University of Wisconsin-Oshkosh

Funding for this conference is provided by NSF grant DMS-0846477 through the MAA Regional Undergraduate Conferences program, www.maa.org/RUMC .

FRIDAY EVENING

5:00 **Registration**, conversation, coffee, juice, fruit, and rolls in Cofrin basement lounge

STUDENT TALKS

Time	COF 11	COF 15	COF 209
5:40	**Nicole Harp** St. Norbert College "An Extension of the Hiring Problem"	**Amanda Sigl** St. Norbert College "Modeling Chemical Structures Using Origami"	**Brian Pietsch** St. Norbert College "Parameterizing the Koch Curve"
6:00	**Josh Collins** Carthage College "The Mathematics of Juggling "	**Thymur Chaudhry** Benedictine University "Enumerating 5-crossing Knot Mosaics in a Hexagonal Grid"	**Caesar Cai** St. Norbert College "Generalizations of the Koch Curve and Their Dimensions"
6:20	**Amber Bakkum** Carthage College "Zero Gravity Flight with NASA: Modal Evaluation of Fluid Volume in Spacecraft Propellant Tanks"	**Mirza Baig** Benedictine University "Counting Hextile Knot Mosaics"	**Abby Wendricks** St. Norbert College "Assessing the Risk of an Oil Spill in the Arctic "
6:40	**Nate Card** Carthage College "Benford Melodies"	**Maria Radcliffe** Benedictine University "A Node-weighted Model for the Spread of a Non-indigenous Species"	**Ryan Hallberg** St. Norbert College "The Probability of Winning Shut Box"
7:00	**Kelsey Nelson** College of St. Scholastica "Continued Fraction Expansion"	**Miranda Henderson** Benedictine University "Comparison of Boolean and Continuous Dynamics of Three-Gene Regulatory Networks"	**Jared Catenacci** UW-Milwaukee "Spatial Spread of Wolbachia Infected Mosquitoes: An Attempt to Control Dengue Fever"

7:30 - 8:30 **JOHN KOKER** Cofrin 11
"Mathematical Reflections"

8:30 – 9:30 **Face Off! The Mathematics Game Show** Cofrin 11
Ken Price, Steve Szydlik, John Koker, UW - Oshkosh

9:30 - ? Pizza in Cofrin Basement Lounge

SATURDAY MORNING

8:30 **Registration**, conversation, coffee, juice, fruit, and rolls in Cofrin basement lounge

STUDENT TALKS

Time	COF 11	COF 15	COF 209
9:10	**Kan Wu** Purdue University Calumet "A Mathematical Model for the Emergence of HIV Drug Resistance during Time-varying Antiretroviral Treatment"	**Mary Bohlke** Loras College "Paper-Folding Geometry"	**Erik Miller** St. Norbert College "From Golf Balls to Airplanes; What Can Dimples Do for You?"
9:30	**Mark Gerads** Winona State University "Relation of the Riemann Zeta Function to Non-Powers"	**Cassie Thill** Loras College "How Many Sudoku Are There?"	**Linnea Esberg** Mount Mary College "The Menger Sponge Project"
9:50	**Kyle Belshan** Winona State University "Patterns and Conjectures Beyond the Sicherman Dice"	**Nicole Jess** Loras College "Exploring Patterns in Fibonacci Numbers"	**Anna Cepek** Bethany Lutheran College "Zero Forcing Number, Maximum Nullity & Path Cover Number of Edge Subdivision Graphs"
10:10	**Matt Zimmer** College of St. Benedict & St. John's U. "The Impact of Non-Reproductive Groups on Persistence of STIs in Populations without Stable Pair"	**Enela Aliaj** Benedictine University "An Edge-weighted Model for the Spread of a Non-indigenous Species"	**Angela Kraft** Bethany Lutheran College "Matrix Completion Problems"
10:30	**Maria Sakalosky** College of St. Benedict & St. John's U. "Searching for Chaotic Behavior in a Three-Species Predator Prey Model"	**Marihan Hegazy** Benedictine University "Comparison of Boolean and Continuous Dynamics of Four-Gene Regulatory Networks"	**Sara Krueger** Bethany Lutheran College "A Reservoir Model of Chagas Disease"

11:00 - noon **JOHN KOKER** Cofrin 11
"Events of Sequence"

DETAILED PROGRAM

Friday, November 11

5:00 p.m. Registration, socializing, cookies, and soda in Cofrin basement lounge.

5:40 - 7:15 **Student Talks** in Cofrin 11, Cofrin 15, and Cofrin 209

5:40 – 5:55

COF 11 **Nicole Harp, St. Norbert College**
An Extension of the Hiring Problem
A classic probability problem, the Hiring Problem, also known as the Secretary Problem, looks at the optimal strategy for hiring the best-qualified candidate from a pool of applicants. It is dependent on the fact that an applicant cannot be revisited once he or she has been interviewed. This talk will take a look at the mathematics associated with a variation of the original problem.

COF 15 **Amanda Sigl, St. Norbert College**
Modeling Chemical Structures Using Origami
Many different organic compounds exist in nature in varying sizes, shapes, and structures. Using origami, we can model these structures in order to determine key mathematical properties, including angles of bonds as well as the number of carbon rings in the diameter. In addition, looking at the physical model, we are able to use graph theory to determine whether or not the molecules are planar.

COF 209 **Brian Pietsch, St. Norbert College**
Parameterizing the Koch Curve
One of the most famous fractals is the self-similar Koch curve. It is known for having infinite length, and it is generated by infinite iterations of four affine transformations. We use these transformations along with a base-4 addressing scheme to create a well-defined, continuous parameterization of the Koch curve.

6:00 – 6:15

COF 11 **Josh Collins, Carthage College**
The Mathematics of Juggling
In this report we study the mathematical properties of juggling. Juggling patterns can be described in mathematical terms that allow us to analyze their properties. We focus on transitioning, or switching, between patterns with an equal number of balls and then go into more depth on transitioning between patterns with different numer of balls. Also we looked into enumerating specific threads, or infinite lists, of juggling sequences in order to categorize them.

COF 15 **Thymur Chaudhry, Benedictine University**
Enumerating 5-crossing Knot Mosaics in a Hexagonal Grid
A hexagonal knot mosaic is a particular type of embedding of a knot diagram in a regular hexagonal grid. We discuss a method for enumerating hexagonal knot mosaics of knot of knot diagrams for knots with crossing number 5 in a hexagonal grid of fixed size.

COF 209 **Caesar Cai, St. Norbert College**
Generalizations of the Koch Curve and Their Dimensions
Unlike traditional geometric shapes, fractals may have non-integer dimensions. And, the Koch curve is one of the basic fractals, which has the dimension $\log 4/\log 3$. We will start with introducing the Koch curve and fractal dimensions. Then, we will use the Koch curve as an example to explain how the dimension equation $\sum_{i=1}^{n} c_i^{\,s} = 1$ works. Once we understand the dimension equation, the three questions will be raised: how can the Koch curve be generalized, when can we use the Dimension Equation, and what dimensions are possible with generalizations of the Koch curve. We will then figure out the three questions step by step. Finally, we will pay special attention to the space-filling variation, and discuss number of the pre-images when we parameterize the generalized Koch curve with dimension 2.

6:20 – 6:35

COF 11 **Amber Bakkum, Carthage College**
Zero Gravity Flight with NASA: Modal Evaluation of Fluid Volume in Spacecraft Propellant Tanks
Flying with NASA on the "Vomit Comet", we investigated a novel, real-time method of determining the volume of propellant present in a spacecraft tank. In the experiment, modal analysis techniques are applied to detect shifts in resonant mode frequencies of a fluid-loaded tank as fluid is = drained from the tank. Ground testing of the experimental methods is compared with the flight data, and the resolution of the analysis is estimated to be better than 10% of actual fill-fraction. Comparison with existing direct and indirect techniques for assessing propellant volume in reduced gravity suggests that the modal analysis method *may* prove to be more cost effective and afford better resolution than existing methods.

COF 15 **Mirza Baig, Benedictine University**
Counting Hextile Knot Mosaics
A hexagonal knot mosaic is a particular embedding of a knot diagram in a regular hexagonal grid. A hextile is a hexagonal tile containing between zero and three strands in its interior. Specifically, we will be looking at the 6_2 knot in a three ring hextile mosaic. We will present strategies for counting the different projections of the 6_2 knot. We will conclude by talking about the further directions of this particular research.

COF 209 **Abby Wendricks, St. Norbert College**
Assessing the Risk of an Oil Spill in the Arctic
Drilling in the arctic region is a topic which has been discussed at length in the American legislature. Current legislation proposes the placement of 20 oils rigs in the Arctic Ocean. We are interested in estimating the probability of a major oil spill if this plan is enacted. We use data on drilling productivity, the frequency and severity of past spills from oil rigs and oil transport to estimate the probability and impact of an oil spill in the Arctic ecosystem.

6:40 – 6:55

COF 11 **Nate Card, Carthage College**
Benford Melodies
Benford's Law can be applied to many things: addresses, stock prices, river lengths. However, in this presentation we will explore using Benford's Law to both analyze and create melodies. The principal question being thus: do most melodies follow Benford's Law by the very nature of musical composition and counterpoint, or would composing melodies using Benford's Law create truly original sounding stochastic music.

COF 15 **Maria Radcliffe, Benedictine University**
A Node-weighted Model for the Spread of a Non-indigenous Species
We present and analyze a model for the spread of a non-indigenous species (NIS) through a network. The model is a modified version of an SI epidemic model on a network in which the transmissibility rate from one node to another depends on the density of the NIS at the node at which the NIS is already present. This work is part of a larger project devoted to the study of the spread of the urban weed Ailanthus altissima (tree of heaven) throughout the United States.

COF 209 **Ryan Hallberg, St. Norbert College**
The Probability of Winning Shut Box
The game of Shut Box is played by rolling two dice simultaneously. The player then "shuts" various boxes based on the roll. The rules are very simple but the math behind the scenes is very in depth. This talk will examine the probability of winning the game by using the techniques of Baye's Rule as well as Markov Chains.

7:00 – 7:15

COF 11 **Kelsey Nelson, College of St. Scholastica**
Continued Fraction Expansion
A continued fraction has the form $a_0 + \frac{1}{a_1+\frac{1}{a_2+\frac{1}{a_3+\cdots}}}$. We will talk about how we can use modulos to find the expanded forms of regular fractions. We will also see that interesting things happen when the a_ns all equal 1 and when they all equal 2 (we get the golden ratio and $\sqrt{2}$, respectively).

COF 15 **Miranda Henderson, Benedictine University**

Comparison of Boolean and Continuous Dynamics of Three-Gene Regulatory Networks

We compare the dynamics of continuous models and Boolean models of certain three-gene regulatory networks, in which there are feedback loops. We also discuss the occurrence of Hopf bifurcations in the continuous model to understand the similarities between the continuous and Boolean models and their relationship to the occurrence of feedback loops.

COF 209 **Jared Catenacci, UW-Milwaukee**

Spatial Spread of Wolbachia Infected Mosquitoes: An Attempt to Control Dengue Fever

Current strategies for controlling the mosquito transmitted dengue virus rely upon reducing mosquito populations. An alternative method involves releasing mosquitoes infected with the bacterium Wolbachia, which reduces mosquito lifespan and ability to acquire and transmit dengue virus. We developed both stochastic and deterministic discrete time metapopulation models to study the spread of Wolbachia. Using numerical simulations we studied different release strategies and effects of fitness costs and movement rates on the speed at which Wolbachia spreads though subpopulations (wave speed). We found that releasing Wolbachia into multiple, neighboring subpopulations increases its ability to spread for a wider range of fitness and migration rates. In addition, we studied the effects of varying subpopulation size and found that the wave speed decreased and was more sensitive to fitness costs and movement rates. Differences in wave speed between stochastic and deterministic models were also discovered. The fitness parameter determines which model has the faster wave speed for a given parameter set. Overall, we found that under a variety of conditions, Wolbachia can spread and Wolbachia-infected mosquitoes can replace an existing population.

7:30 – 8:30

Cofrin 11 Invited Address: **JOHN KOKER, University of Wisconsin-Oshkosh**

Mathematical Reflections

I will share some memories and thoughts about some of the mathematicians and mathematics I have encountered since my time as a student in St. Norbert College in the early 1980's. This reflective talk will include the statements, the solutions (hopefully), and some generalizations of a few the problems with which I have been confronted as a student, teacher and mathematician. These problems allowed me the opportunity to experience being stuck, understand that the state of being stuck is a natural and honorable place to spend time during the problem solving process, and examine and apply methods to become unstuck while being inspired and supported by my teachers and colleagues.

8:30 – 9:30 **Face Off! The Mathematics Game Show** in Cofrin 11

9:30 – ??? **Pizza Social** in Cofrin Basement Lounge; everyone at the conference is welcome!

Saturday, November 12

8:30 a.m. **Registration**, conversation, coffee, juice, fruit, and rolls in Cofrin basement lounge

8:50 – 10:45 **Student Talks** in Cofrin 11, Cofrin 15, and Cofrin 209

9:10 – 9:25
COF 11 **Kan Wu, Purdue University Calumet**
A Mathematical Model for the Emergence of HIV Drug Resistance during Time-varying Antiretroviral Treatment
In treating HIV infection, strict adherence to drug therapy is crucial in maintaining a low viral load, but the high dosages required for this often have toxic side effects which make perfect adherence to Antiretroviral Therapy (ART) unsustainable. Moreover, even in the presence of drug therapy, ongoing viral replication can lead to the emergence of drug-resistant virus variances. In this work we introduce a mathematical model that incorporates two viral strains, wild-type and drug-resistant, to investigate theoretically and numerically HIV pathogenesis during ART. A pharmacokinetic model is employed to estimate the drug efficacies. Furthermore, we investigate numerically the antiviral response and we characterize successful drugs or drug combination scenarios for both strains of virus.

COF 15 **Mary Bohlke, Loras College**
Paper-Folding Geometry
Most everyone knows origami as the Japanese art of paper folding. However recently, mathematicians have analyzed paper folding from an axiomatic perspective. In this talk, I will introduce you to the 7 axioms. These axioms can be used to construct objects which are impossible to create with just a ruler and compass. I will discuss my current exploration of the constructability of regular n-gons.

COF 209 **Erik Miller, St. Norbert College**
From Golf Balls to Airplanes; What Can Dimples Do for You?
Dimples are known to improve the performance of golf balls, but how do dimples help a golf ball travel farther? Could this principle be applied to airplane design? We'll look at the aeronautical theory behind the dimples and see how it could affect the flight of aircraft.

9:30 – 9:45

COF 11 **Mark Gerads, Winona State University**

Relation of the Riemann Zeta Function to Non-Powers

In this presentation, we will examine the natural numbers that are non-powers, i.e. any natural number that is not a perfect power, and their relation to the Riemann Zeta Function. By natural numbers, we mean the elements of the set $\mathbb{N} = \{1, 2, 3, \dots\}$, and by perfect powers, the elements of the set $S = \{a^b | a, b \in \mathbb{N}, b > 1\}$ and non-powers, $M = \mathbb{N} - S$. We will observe the basic properties of non-powers and new formulae for the Riemann Zeta function.

COF 15 **Cassie Thill, Loras College**

How Many Sudoku Are There?

We will start by explaining what a Sudoku puzzle is, and what the rules are. We will discuss what it means for two puzzles to be "essentially different" and look at how many essentially different puzzles there are. We'll use some group theory and discussion of symmetries to explain this, and follow it up with a simple example looking at 4×4 mini-sudokus. We'll end by looking at directions for future research, in particular counting how many different puzzles there are vs. how many different solutions there are.

COF 209 **Linnea Esberg, Mount Mary College**

The Menger Sponge Project

Menger's Sponge is a fractal solid made by removing a cube 1/27th the size of the original from each face, as well as the very center; this is also done to the remaining cubes, and those that remain after that - infinitely. Menger's Sponge has some surprising characteristics such as the surface area, the volume, and its dimension. Low level iterations of the Menger Sponge can be modeled with business card origami that also leads to interesting counting problems.

9:50 – 10:05

COF 11 **Kyle Belshan, Winona State University**

Patterns and Conjectures Beyond the Sicherman Dice

Sicherman dice and two regular dice hold the same probability for rolling each number when finding the sum. This presentation will give some insight into the history behind these amazing dice and how concepts of abstract algebra can be used to study them. It will also go into the proof of why Sicherman dice are the only kinds of dice that hold this property. The methods used in the proof can also be used in different kinds of dice with more than two dice. This presentation will also look at certain patterns of many different kinds of dice and the abstract algebra behind these patterns.

COF 15 **Nicole Jess, Loras College**
Exploring Patterns in Fibonacci Numbers
A wide variety of interesting patterns may be observed within the well-known sequence of Fibonacci numbers, which is generated by the relationship $F_n = F_{n-1} + F_{n-2}$ beginning with $F_1 = F_2 = 1$. In this talk I will discuss some of the patterns that I have observed and outline proofs of some of the results.

COF 209 **Anna Cepek, Bethany Lutheran College**
Zero Forcing Number, Maximum Nullity & Path Cover Number of Edge Subdivision Graphs
The zero forcing number, maximum nullity and the path cover number are useful tools in the study of minimum rank problems. Results relevant to these properties for an edge subdivision graph are presented and an open question in the literature is answered.

10:10-10:25
COF 11 **Matt Zimmer, College of St. Benedict & St. John's University**
The Impact of Non-Reproductive Groups on Persistence of STIs in Populations without Stable Pair
This talk discusses a logistic, two-sex population model where individuals form pairs solely for the mating process. After we develop the first model, we extend it to contain sexually abstaining groups and a sexually transmitted infection. It is shown that under certain conditions the presence of the sexually abstaining groups can eliminate an infection from a population or prevent the infection from invading. These results are discussed in relation to a previous model done in which mating only occurred within stable pairs.

COF 15 **Enela Aliaj, Benedictine University**
An Edge-weighted Model for the Spread of a Non-indigenous Species
We present and analyze a model for the spread of a non-indigenous species (NIS) through a network. The model is a modified version of an SI epidemic model on a network in which the transmissibility rate from one node to another depends on a weight assigned to the edge connecting a pair of nodes. This work is part of a larger project devoted to the study of the spread of the urban weed Ailanthus altissima (tree of heaven) throughout the United States. In the Ailanthus altissima model, the weights are proportional to the number of roads and railroad lines between distinct locations.

COF 209 **Angela Kraft, Bethany Lutheran College**

Matrix Completion Problems

Matrix completion problems ask the question, "Under what circumstances can partial matrices having some unspecified entries be completed to satisfy a given property?" We explore property of matrix commutativity, or $AX - XA = 0$, using the polynomial, matrix equation, and graph theoretic approaches. Our research group created and proved a classification theorem which gives the patterns of specified entries in X that can be completed to commute with a Jordan block matrix A. This can then be extended to circumstances where A is a direct sum of Jordan block matrices as well as when A is permutation similar to a Jordan block matrix.

10:30-10:45

COF 11 **Maria Sakalosky, College of St. Benedict & St. John's University**

Searching for Chaotic Behavior in a Three-Species Predator Prey Model

This presentation explores chaotic behavior exhibited in the solution trajectories of a three-species continuous dynamical system. By first establishing a firm understanding of dynamical systems theory, specific parameter values and initial conditions of a particular system may be altered and monitored in search for chaotic behavior. Using Matlab programming, chaotic behavior may be discovered in a system based upon Lotka-Volterra equations in order to model the interactions between three species.

COF 15 **Marihan Hegazy, Benedictine University**

Comparison of Boolean and Continuous Dynamics of Four-Gene Regulatory Networks

We compare the dynamics of continuous models and Boolean models of certain four-gene regulatory networks in which there are feedback loops. We also examine the effects of the presence of two-gene feedback loops on the dynamics in both the Boolean and continuous cases.

COF 209 **Sara Krueger, Bethany Lutheran College**

A Reservoir Model of Chagas Disease

More than 1 billion people all over the world are infected with neglected tropical diseases, such as Chagas disease in Latin and South America. Like malaria, this disease is passed between infected animals and people by an insect, the reduviid bug. An ordinary differential equations model was developed that accounts for the existence of a disease reservoir in mammals, such as domestic livestock. The results show that the disease free state is not a stable equilibrium, meaning that the introduction of even a small number of insects will lead to an epidemic.

11:00 – 12:00
Cofrin 11 Invited Address: **JOHN KOKER, University of Wisconsin-Oshkosh**

Events of Sequence

Well-known and familiar sequences of integers, such as the Fibonacci, Catalan and Bell numbers often appear in interesting and sometimes unexpected places. During this talk we will discuss, among other topics, 2-player games, poetry writing and the associative property that will lead to the appearance of sequences of integers. An understanding of some basic mathematics can guarantee victory in a number of 2-player games.

John Koker is the Dean of the College of Letters and Science at the University of Wisconsin-Oshkosh. He earned a B.A. from St. Norbert College. He received an M.S. in Mathematics from Purdue University in 1986 and a Ph.D. in Mathematics from the University of Wisconsin-Milwaukee in 1990. He joined the UW-Oshkosh mathematics faculty in 1991. He was promoted to associate professor in 1997 and to professor in 2002. Since 2006, he has served as the university's Dean of the College of Letters and Science. John's research interests include theory of rings and modules, graph theory, and mathematics education. He has authored several publications and presented many talks. John has a special gift and passion for teaching. He has authored or co-authored grants, worth over $300,000, targeted at enhancing mathematics education in the upper elementary and middle school grades. His emphasis on problem solving is reflected in his own words: "I want my students to have the opportunity to be 'stuck', understand that the state of being 'stuck' is a natural and honorable place to spend time during the problem solving process, and examine and apply methods to become 'unstuck'." His teaching methods are effective and well recognized. He has received two of the highest awards at UW-Oshkosh: the UW-Oshkosh Distinguished Teaching Award in 2002, and the John McNaughton Rosebush Professorship for Excellence in Teaching in 2004. In 2006 he was awarded the Board of Regents Teaching Excellence Award, the highest recognition for teaching in the University of Wisconsin system.

INVITED SPEAKERS FOR THE ST. NORBERT COLLEGE PI MU EPSILON REGIONAL UNDERGRADUATE MATHEMATICS CONFERENCES

1986 Paul Campbell, Beloit College
1987 Joseph Gallian, University of Minnesota - Duluth
1988 Philip Straffin, Beloit College
1989 J. Sutherland Frame, Michigan State University
1990 Jeanne LaDuke, De Paul University
1991 J. Douglas Faires, Youngstown State University
1992 James Kasum, Cardinal Stritch College
1993 Mark Krusemeyer, Carleton College
1994 Robert S. Smith, Miami University
1995 Norbert J. Kuenzi, UW - Oshkosh
1996 Donald Saari, Northwestern University
1997 Paul J. Humke, St. Olaf College
1998 I. Martin Isaacs, UW - Madison
1999 Lisa Townsley Kulich, Benedictine University
2000 S. Brent Morris, National Security Agency
2001 Aparna Higgins, University of Dayton
2002 Frank Morgan, Williams College
2003 Richard A. Brualdi, UW – Madison
2004 Erica Flapan, Pomona College
2005 Alexander Hahn, The University of Notre Dame
2006 Underwood Dudley, Tallahassee, Florida
2007 Keith Devlin, Stanford University
2008 Eve Torrence, Randolph-Macon College
2009 Dan Kalman, American University
2010 Judy Holdener, Kenyon College
2011 John Koker, University of Wisconsin-Oshkosh

WINNERS OF THE REV. NICHOLAS E. NIRSCHL SCHOLARSHIPS

1996 Dawn Gibson, Jacqueline Gosz, Sarah Nohr, Nicki Schleis, Dennis Schmidt
1997 Debbie Giesler, Tina Huss, Mark Meeker
1998 Laura Lemke, Jenny Schmidt, Libby Wiebel
1999 Renee Jonet, Erica Pagel, Kate Rendall
2000 Michelle Budzban, Danielle Delimata, Heather Olm, Rosemary Tomase, Jeremy Vosters
2001 Cinnamon Danube, Abby Mroczenski, Laura Weiland
2002 Erin M. Bergman
2003 Tammy Bastian, Rachel Meulemans, Jill Schmidt
2004 Adam Christman, Brian Hahn, John Karls, Monica Spang, Damian Wegner
2005 Josh Domina, Christy Ernst, Mike Konicki, Martina Weber, Angie Wille, and AJ Wood
2006 Trina Bower, John Moss, Nicole O'Connell, Jackie Van Ryzin
2007 Elizabeth Colletti, Mark Krines, Sarah Schultz
2008 Francis Beaumier, Kyle Diederich, Jenni Jacobsen, Ryan Pavlik
2009 Brice Hilgemann, Michelle Keehan, Kathleen Miller, Stephanie Schauer, Adam Ziegler
2010 Jamie Biesinger, Bill Lancelle, Benjamin Newman, Renee Wenig
2011 Nicole Harp, Brian Milinski, Katie Steinfeldt