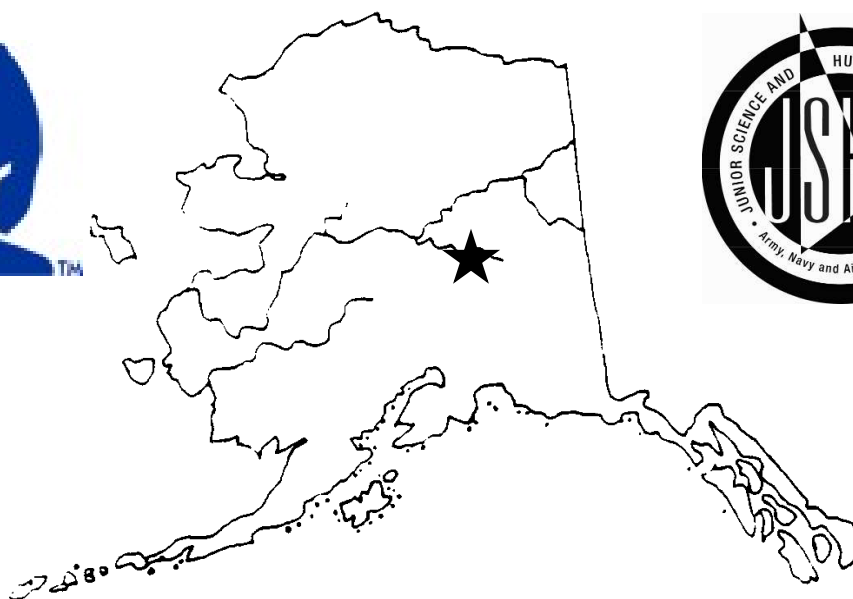


THIRTY-FIFTH UAF ANNUAL MEETING
OF THE
ALASKA STATEWIDE HIGH SCHOOL
SCIENCE SYMPOSIUM (ASHSSS)
AND
ALASKA REGIONAL
NATIONAL JUNIOR SCIENCE AND HUMANITIES
SYMPOSIUM (NJSHS)
UNIVERSITY OF ALASKA FAIRBANKS
28 March 2020



2020 ASHSSS/NJSHS
SYMPOSIUM PROGRAM & PROCEEDINGS

2020

Important Dates and Deadlines

35th Alaska Statewide High School Science Symposium (ASHSSS/NJSHS)

BEFORE Experimentation:	Complete the <i>ASHSSS Project Approval Form</i> (and additional forms, as required) with <u>proper signatures</u> . (Submit with registration materials.) VISIT OUR WEBSITE AT: http://www.uaf.edu/cnsm/ashsss-2/
February 10:	Registration opens at http://www.cvent.com/d/wgq6v2/4W
February 28: (Material <u>receipt</u> Date)	Submit all materials required for registration at http://www.cvent.com/d/wgq6v2/4W . Register Online! Submit any other forms, <i>Student Grants</i> , and <i>Chem.190P Registration online as well</i> . Keep copies of all documents submitted. Registration will be open until 11:59pm.
March 13:	Student notification regarding participation selection in the ASHSSS at UAF and feedback on research paper.
March 27: 5:30-7:00 p.m. Friday	Students planning to use a computer during their presentation: Test equipment and software compatibility at UAF's Reichardt Building in the room designated for your PowerPoint delivery session (Check in at room 207).
March 28: Saturday	ASHSSS Finals Sessions at UAF's Reichardt Building (white) located at middle to upper campus. 8:00 am: Registration (2 nd floor mezzanine). 8:30 am: Plenary Session (Room 201A & B). Required! 9:00 am-3:20pm: Three Sequential Student Presentation Finals Sessions (Room 201A & B). 6-8 pm: Awards Banquet (IARC – 501 Akasofu Building). Participating Students may bring two guests at no cost!
April 15-18	National JSHS travel for the top 5 overall winners & chaperone. The 58 th National JSHS in Norfolk, Virginia.

What is JSHS?

The Junior Science and Humanities Symposia (JSHS) Program promotes original research and experimentation in the sciences, technology, engineering, and mathematics (STEM) at the high school level and publicly recognizes students for outstanding achievement. By connecting talented students, their teachers, and research professionals at affiliated symposia and by rewarding research excellence, JSHS aims to widen the pool of trained talent prepared to conduct research and development vital to our nation.

The JSHS Mission

- To promote research and experimentation in the sciences, engineering, and mathematics at the high school level.
- To recognize the significance of research in human affairs and the importance of humane and ethical principles in the application of research results.
- To search out talented youth and their teachers, recognize their accomplishments at symposia, and encourage their continued interest and participation in the sciences, mathematics, and engineering.
- To expand the horizons of research-oriented students by exposing them to opportunities in the academic, industrial, and governmental communities.
- To increase the number of future adults capable of conducting research and development.

Regional and National Symposia

Endorsed by the National Association of Secondary School Principals (NASSP), JSHS regional and national symposium are held during the academic year and reach over 10,000 high school students and teachers throughout the United States, Puerto Rico, and the Department of Defense Schools of Europe and the Pacific Rim. Each of 48 university-held regional symposia invite the participation of secondary schools within their region. By participating in a regional symposium, students and teachers may...

- Participate in a forum honoring exceptional work in the sciences, engineering, or mathematics, and supporting personal and professional growth.
- Interact with practicing professionals who provide enrichment opportunities and discussions that allow participants to look beyond high school to future post-secondary education and career development in the sciences, engineering, or mathematics.
- Develop higher-order thinking skills and integrated learning across disciplines through the process of scientific inquiry, writing a scientific paper, and delivering a presentation – all skills that will benefit student's future post-secondary and graduate pursuits.
- Support and encourage the success of high school teachers in addressing the attainment and mastery of state and national performance and process skill standards in the sciences, mathematics, and language arts by their students.
- Participate in a scientific conference, visit research and development laboratories, and have their abstract published in symposium proceedings.
- Gain self-confidence through the experience of conducting an independent research investigation and by networking among other participants with similar interests.
- Advance in research paper competition to the National symposium and for significant military-sponsored scholarships and other awards.

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ORGANIZING COMMITTEE

Dr. Javier Fochesatto, Director
Dr. Kriya Dunlap, Co- Director
dr. Andrej Podlutsky, Co-Director

Christopher Benshoof, Teacher
Julie Zundel, Teacher
Krystal Bass, Teacher

Acknowledgments

The ASHSSS Directors graciously acknowledges the following agencies, organizations, companies, institutions, groups and many individuals for their support of the **Alaska Statewide High School Science Symposium (ASHSSS)**, *a College of Natural Science and Mathematics STEM Program* at the University of Alaska Fairbanks. Below are the valuable contributors who have provided mentors, paper readers, judges, in-kind, scholarship, and cash contributions.

Contributors

Academy of Applied Science (NJSHS):

U.S. Air Force Research Office, AFRO
U.S. Army Research Office, ARO
U.S. Navy, Office of Naval Research, ONR

Special Awards by Alaska Chapters & Branches of the:

American Society for Microbiology, Alaska Branch
Mining & Geological Engineering

Regional Contributors:

Alaska Cooperative Fish and Wildlife Research Unit
Alaska Department of Natural Resources
Alaska Department of Fish and Game
Alaska Songbird Institute
Alaska State Virology Laboratory
Alaska Volcano Observatory
Fairbanks Memorial Hospital and Denali Center
Fairbanks North Star Borough School District
Fort Wainwright, U.S. Army
Usibelli Foundation
United States Fish & Wildlife Service
United States Geological Survey

University of Alaska Fairbanks:

Chancellor's Office
College of Engineering and Mines
College of Fisheries and Ocean Sciences
College of Liberal Arts
College of Natural Science and Mathematics
Geophysical Institute
Institute of Arctic Biology
Institute of Northern Engineering
International Arctic Research Center
University of Alaska Foundation
University of Alaska Fairbanks Event Scheduling
University of Alaska Fairbanks Honors Program
University of Alaska Fairbanks Relations

35th ASHSSS/NJSHS 2020 Annual Meeting

University of Alaska Museum of the North

And over 120 valued volunteers annually!

FRIDAY'S SCHEDULED EVENTS FOR STUDENT PRESENTERS
27 MARCH 2020

5:30p-7:00p **Student Presenter Practice and Computer Check** REICH 207

SATURDAY'S SCHEDULED EVENTS FOR STUDENT PRESENTERS
28 MARCH 2020

8:00a-8:30a **Student Presenter Registration** REICH Mezzanine

8:30a-9:00a **Plenary Session** REICH 201AB

8:30a **Opening Comments:** Dr. Javier Fochesatto
Director of ASHSSS/NJSHS and Co-Directors

8:35a **UAF Welcome:** Dr. Kinchel Doerner
Dean College of Natural Science and Mathematics

8:45a **Program, Proceedings, Instructions & Schedule Changes:** Prof. Javier Fochesatto

8:55a **Finals Session Prep**

9:00a-10:40a **Finals Presentation Session 1** REICH 201AB

9:00-9:25a **TBD**

9:25a-9:50a **TBD**

9:50a-10:15a **TBD**

10:15a-10:40a **TBD**

10:40a-10:55a **Intersection:** Fluids and Crumpets REICH Mezzanine

10:55a-12:35p **Finals Presentation Session 2** REICH 201AB

10:55a-11:20a **TBD**

11:20a-11:45a **TBD**

11:45a-12:10a **TBD**

12:10a-12:35a **TBD**

12:35p-1:15p **Judges and Staff Have Lunch** REICH 300

1:15p-3:20p **Finals Presentation Session 3** REICH 201AB

1:15p-1:40p **TBD**

1:40p-2:05p **TBD**

2:05p-2:30p **TBD**

2:30p-2:55p **TBD**

2:55p-3:20p **TBD**

3:20p-4:15pm **Judges Deliberate** REICH 300

6:00p-8:00p **ASHSSS Awards Banquet
Symposium Results** **IARC – 501
Akasofu Building**

SATURDAY'S SCHEDULED EVENTS FOR JUDGES
28 MARCH 2020

8:00a-8:30a	Judges Breakfast Meeting	REICH 300
8:30a-9:00a	Plenary Session	REICH 201AB
9:00a-10:40a	Finals Presentation Session 1	REICH 201AB
	9:00-9:25a TBD	
	9:25a-9:50a TBD	
	9:50a-10:15a TBD	
	10:15a-10:40a TBD	
10:40a-10:55a	Intersection: Fluids and Crumpets	REICH Mezzanine
10:55a-12:35p	Finals Presentation Session 2	REICH 201AB
	10:55a-11:20a TBD	
	11:20a-11:45a TBD	
	11:45a-12:10a TBD	
	12:10a-12:35a TBD	
12:35p-1:15p	Judges and Staff Have Lunch	REICH 300
1:15p-3:20p	Finals Presentation Session 3	REICH 201AB
	1:15p-1:40p TBD	
	1:40p-2:05p TBD	
	2:05p-2:30p TBD	
	2:30p-2:55p TBD	
	2:55p-3:20p TBD	
3:20p-4:15pm	Judges Deliberate	REICH 300

FRIDAY'S SCHEDULED EVENTS FOR STAFF
27 MARCH 2020

5:30p-7:00p	Student Presenter Practice and Computer Check drs. Fochesatto, Dunlap, Podlutsky.	REICH 207
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SATURDAY'S SCHEDULED EVENTS FOR STAFF
28 MARCH 2020

7:30a-4:15pm	Logistics and Staging Drs. Fochesatto, Dunlap, Podlutsky	REICH 207
7:30a-4:15p	Computer Technologist and Photographer drs. Fochesatto, Dunlap, Podlutsky	REICH 207
7:30p-4:15p	Judge and Staff Lounge Drs. Fochesatto, Dunlap, Podlutsky	REICH 300
8:00a-8:30a	Student Presenter Registration Drs. Fochesatto, Dunlap, Podlutsky	REICH Mezzanine 2 nd Floor
8:30a-9:00a	Plenary Session Drs. Fochesatto, Dunlap, Podlutsky	REICH 201A&B
9:00a-12:20	Finals Sessions 1 Timers and Assistants Timers: TBD, TBD Door Assistants: TBD, TBD	REICH 201A&B
10:40a-10:55a	Intersection: Fluids and Crumpets	REICH Mezzanine
10:55a-12:35p	Finals Sessions 2 Timers and Assistants Timers: TBD, TBD Door Assistants: TBD, TBD	REICH 201A&B
12:35p-1:15p	Lunch	REICH 300
1:15p-3:20p	Finals Sessions 3 Timers and Assistants Timers: TBD, TBD Door Assistants: TBD, TBD	REICH 201A&B
6:00p-8:00p	ASHSSS Awards Banquet All Staff Invited!	UAF Wood Center

LOGISTICIANS AND STAFF

Dr. Javier Fochesatto	gjfochesatto@alaska.edu	907-474-7602
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SATURDAY FINALS SESSION JUDGES

Dr. Greg Breed	UAF Biology and Wildlife	gabreed@alaska.edu
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Krystal Bass	West Valley High School, Fairbanks, Alaska
Christopher Benshoof	Austin E. Lathrop High School, Fairbanks, Alaska
Julie Zundel	West Valley High School, Fairbanks, Alaska

MENTORS

Christopher Benshoof	Austin E. Lathrop High School, Fairbanks, Alaska
----------------------	--

PAPER/ABSTRACT REVIEWERS

Dr. Greg Breed	University of Alaska Fairbanks, Biology and Wildlife
Dr. Cheng-fu Chen	University of Alaska Fairbanks, Mechanical Engineering
Dr. Robert Coker	University of Alaska Fairbanks, Biology and Wildlife
Dr. William Howard	University of Alaska Fairbanks, Chemistry and Biochemistry
Dr. Jingqui Mao	University of Alaska Fairbanks, Atmospheric Science
Dr. S. Ryan Oliver	University of Alaska Fairbanks, Chemistry and Biochemistry
Dr. Jen Peterson	University of Alaska Fairbanks, Psychology
Dr. Rorik Peterson	University of Alaska Fairbanks, Mechanical Engineering
Dr. Daní Sheppard	University of Alaska Fairbanks, Psychology
Dr. Anthony Rickard	University of Alaska Fairbanks, Mathematics and Statistics
Dr. Naoki Takebayashi	University of Alaska Fairbanks, Biology and Wildlife

BANQUET INVITATION

Dr. Javier Fochesatto, ASHSSS Director

Dr. Kriya Dunlap, ASHSSS Co-Director

Dr. Andrej Podlustky, ASHSSS Co-Director

Dr. Dan White, Chancellor, University of Alaska Fairbanks

Dr. Anupma Prakash, Provost & Executive Vice Chancellor for Academic
Affairs, University of Alaska Fairbanks

Dr. Kinchel Doerner, Dean College of Natural Sciences and Mathematics, UAF

INVITE

ASHSSS Student participants and two quests, Teachers,
ASHSSS Staff and invited Honored Guests

TO ATTEND THE
Alaska Statewide High School Science Symposium
Awards Banquet

Saturday, 28 March 2019, 6:00 - 8:00 p.m.

Main Course

Fresh garden salad with assorted toppings and two dressings

Herb seared chicken thigh with tarragon cream sauce

Eggplant Provençal

Garlic mash potatoes

Steamed broccoli

Rolls & butter

Served with fresh brewed coffee, hot tea, lemonade, iced tea, and iced water

Dessert

Cheesecake with Seasonal Berries

Chocolate Ganache Cake

International Arctic Research Center (IARC)

501 Akasofu Building

(UAF Upper Campus)

Direct questions to:

Prof. Javier Fochesatto

ASHSSS Director

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THIRTY-FIFTH UAF ANNUAL MEETING
ALASKA STATEWIDE HIGH SCHOOL SCIENCE
SYMPOSIUM (ASHSSS)

STUDENT
PRESENTATION SCHEDULES

FINALS SESSION

Finals SESSIONS

REICHARDT 201A&B

<i>PRESENTER</i>	<i>PAPER TITLE</i>	<i>TIME</i>
TBD	TBD	9:00a
TBD	TBD	9:25a
TBD	TBD	9:50a
TBD	TBD	10:15a
<i>INTERSECTION</i>	FLUIDS AND CRUMPETS	10:40a-10:55a
TBD	TBD	10:55a
TBD	TBD	11:20p
TBD	TBD	11:45a
TBD	TBD	12:10a
<i>INTERSECTION</i>	JUDGES AND STAFF HAVE LUNCH	12:35a-1:15p
TBD	TBD	1:15p
TBD	TBD	1:40p
TBD	TBD	2:05p
TBD	TBD 	2:30p
TBD	TBD	2:55p

ASHSSS Judges Score Sheet**Student Presenter:** _____ **Session #:** _____**TIME LIMITS: 15 minutes maximum for presentation 5 minutes maximum for questions**Does this student have a formal mentor? **Yes**____ **No**____

Description	Maximum Points Possible	Points Earned
Title	1	
Background Information / Literature Review	4	
Question Pursued and Hypothesis Tested (Scientific quality and originality)	4	
Methods & Materials (Quality and originality of model or experimental design; appropriate replication)	5	
Results	4	
Discussion	4	
Future Directions(s)	3	
Conclusions	2	
Acknowledgements	2	
Subject Command (Depth of background knowledge)	5	
Quality of Responses to Questions	5	
Delivery of Presentation (Poise, voice, enthusiasm, timing)	4	
Preparation (Quality of visual aides)	4	
Abstract (Printed)	3	
Total Points Earned	50	

Disclaimer: Placement is based on scores **and** discussion between judges. Written papers may also be used in determining placement. Originality and creativity of the project may also be considered. Judges decisions are final.

Judges: Please use the reverse side for additional comments to the student presenter. Comments will be returned to teachers for students or to students directly. Finalists especially appreciate suggestions for improvements, as they will present their project again tomorrow (Sunday) to a different set of judges.

Suggested questions to evaluate student involvement in the research:

- How did you choose your research topic and what resources helped frame your hypothesis?
- What role did your mentor play in the process of data collection and analysis?
 - No mentor or mentor was advisor only.
 - Provided access to equipment and explained its operation, but collection and analysis was done by the student.
 - Assisted with data collection and analysis working side-by-side in all phases.
 - Used archived data, but analysis was student centered.
 - Data collection and analysis was mentor centered (due to project complexity, equipment privileges, or Review Board restrictions, but student observed and/or assisted).
 - Theoretical study: possibly no raw data
- Describe any problems you had to solve in the course of your research.

Judges Comments:

THIRTY-FIFTH UAF ANNUAL MEETING
ALASKA STATEWIDE HIGH SCHOOL SCIENCE
SYMPOSIUM (ASHSSS)

STUDENT PRESENTATION ABSTRACTS

BY PRESENTATION ORDER

EXAMPLES FROM PREVIOUS YEAR's PRESENTATIONS

Title: **Does Size Matter? Testing the Viability of an Invasive Aquatic Plant *Elodea canadensis* and Potential Waterfowl Transport**
Presenter: **Travis Brase**
School: **West Valley High School, Fairbanks, Alaska**
Teacher: **Cyndie Beale**
Mentor: **Audra Brase**

Elodea canadensis (elodea) is an invasive aquatic plant throughout Alaska. Elodea has spread around the state through man-made vectors, such as boats and floatplanes. Elodea has recently been found in remote water bodies with no boat or plane access, leading to the question of how it arrived there. This experiment set out to determine whether or not this expansion could be through animal vectors. This experiment was designed to find the minimum plant fragment length required for elodea to grow into a full viable plant. The elodea was collected from an infested waterbody, then cut into 1, 3 and 5 cm lengths from different parts of the plant (tip, stem, stem without leaves) and then grown in a controlled environment for 12 weeks with weekly measurements. At the end of the study it was determined that the 1 cm fragment types from the tip category grew to an average of 10.4 cm, increasing in size by over 900%. The majority of the other samples also grew throughout the study, developing offshoots and roots, with only 2 samples failing to grow over the 12 week period. Therefore, the hypothesis that elodea can be transmitted via animal vectors was supported.

Title: **Quarterbacks Performance Affected by Weather?**
Presenter: **Jaden Littell**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Christopher Benshoof**

Playing quarterback for a few years has been very fun and I am excited to continue to play for years to come. As I've been playing though, I've always been curious about how weather affects quarterbacks in today's game. I decided to study NFL (national football league) quarterbacks because that's who most people are interested in and the NFL keeps stats for all quarterbacks for many years. I did my research on six different treatment groups. I wanted to see which group had the best average QBR (quarterback rating). A QBR is basically a mixture of the quarterbacks yards, completions, incompletions, touchdowns, and interceptions. The groups I tested was performance in the rain, snow, wind, dome, 64 degrees and below, and 65 degrees and higher. I used the stats from the official NFL league page and I also used NFLWeather.com to find the weather for every NFL game.

Title: **NMR Analysis of Nevirapine Breakdown in Sunlight and Altered pH Conditions**
Presenter: **Linnaea Uliassi**
School: **West Valley High School, Fairbanks, Alaska**
Teacher: **Cyndie Beale**
Mentor: **Dr. Jennifer Guerard, University of Alaska Fairbanks, Fairbanks, Alaska**

Nevirapine, a drug used to treat HIV, has been found in concentrations that pose potential risk to organisms in natural water sources in Germany, South Africa, and Kenya. Drugs related to nevirapine break down as a result of sunlight and microorganisms, though the composition and effects of the molecule after breakdown are unknown. I used nuclear magnetic resonance (NMR) to investigate changes in the nevirapine molecule before and after light exposure in deionized and lake water, at acidic, neutral, and basic pH. Based on NMR peaks attributable to hydrogens on the nevirapine molecule, the acidic deionized and lake water solutions had the most breakdown, with 2 of 8 original tagged peaks remaining. Lower pH may have increased solubility of nevirapine in water, impacting the molecule's ability to be transformed in light. In deionized water, 3 tagged (but different) peaks remained in neutral and basic solutions, possibly as a result of different pHs. Basic and neutral lake water solutions retained all 8 peaks, potentially due to organic material interfering with light. Future work could focus on breakdown after different periods of time and could use a different solvent to eliminate the disruption caused by the water signal in the NMR.

Title: **Correlation of Fairbanks Public School's Indoor PM2.5 Concentrations and Their Distances from Local Power Plants**
Presenter: **Payton Roberts**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Donald Bennett**

The purpose of this study was to determine if there is a correlation between the distance of a Fairbanks public school from the Aurora Energy and University of Alaska power plants and its indoor PM2.5 concentration. This question was explored by sampling four random Fairbanks North Star Borough schools and then sampling two random classrooms from each school. Each selected classroom's PM2.5 concentrations were then measured in particles per cubic foot/100 using a Dylos DC1700 air quality monitor for an entire school day (start time to release time). The schools randomly selected for this study were Hunter Elementary, Woodriver Elementary, Barnette Magnet, and Boreal Sun Charter. There was selection bias in this study as some schools were excluded from sampling for lack of resources and some classrooms were not randomly selected due to principal preference. In the end, there was an extremely weak negative correlation between a school's indoor PM2.5 levels and their distance from the Aurora Energy power plant with an r-value of 0.032. This suggests that there is almost no correlation between the two. In contrast, there was a weak positive correlation between the school's indoor PM2.5 levels and their distance from the University power plant with an r-value of 0.257. These results neither disproved nor supported my hypothesis that there would be a weak negative correlation between the concentrations of PM2.5 and distance.

Title: **Effects of Pre Incubation Temperature on Bobwhite Quail Hatch Rates**
Presenter: **Jessica Johnson**
School: **West Valley High School, Fairbanks, Alaska**
Teacher: **Cyndie Beale**
Mentor: **Marilyn Krause**

Colinus virginianus, Bobwhite Quail, are ground nesting game birds native to North America. Like many birds, quail do not lay their entire clutch of eggs at once, laying one every 18 hours until they have 10-18. Then the eggs are warmed to incubation temperature and the embryo's begin developing. This experiment is designed to test the effects of pre incubation temperature, due to cold snaps or late winter weather, on the hatch rate of bobwhite quail. 200 eggs were purchased, and upon arrival were numbered and randomly sorted into ten groups of 20 eggs. Two groups of 20 were then stored at either room temperature, 4.8 C, 5.8 C, 7.8 C and 9 C for 3 days. After three days at treatment temperature, one group of each treatment were placed into incubators at 37.7 C to begin incubation, while the remaining eggs were brought up to room temperature for 12 hours before being placed in incubation. During incubation all eggs were treated the same, and after 23 days chicks started hatching. Chicks hatched from the control groups first, and a week later chicks from the treatment groups hatched showing physical deformities. The hatch rate and the percent of fully developed embryos out of the fertile eggs in each treatment group was calculated, as well as the correlation coefficient. While there was positive correlation between hatch rate and warmer storage temperatures, the data was not statistically significant enough to fully reject the null hypothesis. However, it does suggest that adverse winter weather could negatively affect game birds.

Title: **Types of Helmets that Protect the Best Against Concussions**
Presenter: **Michael Zadra**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Christopher Benshoof**

At the start of this project, I wasn't sure if I would be able to work out a complete a study of this nature. When I wrote my ideas down, I wasn't actually sure if that's what I wanted to do. But I wanted to know which one really is best, so I started my research. There were tons and tons of different websites, although most of them were not helpful at all, but I got enough information to make due. Looking at all the data I could find was amazing to see all the different ways other scientists conducted their study and data they received. I was very glad to find out about the new VICIS helmet. That was very interesting to me because it was new. So that was used in the data and when compared, it was almost expected that it was such a good helmet. Finding out which helmet protects against concussions the best was my main goal, and I am glad that I got to be able to find the best one out there.

Title: **Mechanical Properties of Ice Reinforced with Long Raw Hemp Fibers**
Presenter: **Luke Millam**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentors: **Jason Millam**
 Nicole Millam

Ice bridges are important in Alaska and are required to move large amounts of materials across rivers. It takes a long time to build ice bridges and it would be a huge boon to Alaska if they could be built faster. One way to do this is to strengthen the ice using hemp. In this study long raw hemp fibers were placed in 24 ice beams at varying densities and tested to determine their ultimate strength. Six ice beams with no hemp were also tested as a control. Each beam was subjected to a 3-point bending test measuring the maximum load each beam could resist at midspan. Both the tensile strength and ductility of the ice beams increased with increased densities of hemp. When the stress of a normal ice beam reached its limit, the ice would shatter and lose all of its strength, whereas the ice beams with hemp would slowly bend and still resist the load. The strongest and most ductile beams had the maximum density of hemp tested at 3.05 pounds of hemp per cubic foot of ice.

Title: **The Analysis and Comparison of Different Alaskan Wood Species and Their Thermal Efficiencies and Emissions**
Presenter: **Donald Bennett**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Christopher Benshoof**

The purpose of this study was to determine which Alaskan wood species generated the best thermal output with the least amount of harmful emissions. This experiment was executed by conducting five trials for each species of wood tested: Birch, Cottonwood, and Spruce. During which the temperatures, time, and emissions were recorded. The results for each species five trials were averaged and then compared with one another. In order to measure which wood was the most thermal efficient markers were developed. After testing, Birch was crowned the resourceful wood for thermal efficiency and the results for harmful emissions were inconclusive. This project would be useful for anyone conducting experiments about fires, different wood species, or the environmental impact of burning wood from emissions.

Title: **Stoptional: Driver Behavior Differences at Stop Sign When a
Police Officer is Present**
Presenter: **Riley Knott**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Kurt Lockwood**

Driver behavior at two intersections described as having “high traffic violations” in Fairbanks, Alaska were each observed on two different occasion at the same time of day. For one observation, a police officer was present at the intersection, for the second observation there was no police presence. As hypothesized, stopping behavior was significantly lower when an officer was not present at the intersection. This was true at both locations.

Title: **Methane and Permafrost Presence in Ponds in Interior Alaska**
Presenter: **Clare Hanneman**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teachers: **Christopher Benshoof**
Carrie Jones
Mentor: **Keith Hanneman**

This study focused on finding a connection between permafrost and methane in lakes in Fairbanks, Alaska and surrounding areas. When permafrost thaws, it can release organic material into the bottom of a lake. This material is decomposed by archaea and released into the atmosphere as methane. Methane is a powerful greenhouse gas that greatly impacts global climate change. I sampled 13 lakes in the Fairbanks area for methane. To do so, I broke through ice on these lakes while holding a flame that was meant to light any escaping methane on fire. I recorded the presence of methane in each lake in addition to my observations of the lake's permafrost status: permafrost, no permafrost, or unknown. 2 lakes tested positively for methane and were located Northeast of Fairbanks. A connection between permafrost and methane was unclear because of the small sample size, as was a connection between location and methane. Further sampling is necessary to come to conclusions. A better understanding of the relationship between permafrost and methane, or location and methane, could lead to an increased understanding of climate change and the regions that influence it most.

Title: **The Efficiency of Various Softball Brands Pertaining to Velocity Calculated by Seam Rotation**
Presenter: **Jaelynn Accola**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Christopher Benshoof**

The study of what softball brand the best was conducted using four different balls all pitched at different speeds through a pitching machine was what my experiment was about. This was studied by reading how baseball experts have tested their own balls using rotations as their unit of measurement. I found that the softball with the best average rotations was 4.3975. Making the best softball by rotation count the Diamond Pro softball used by the Professional Fastpitch League. I did this because I play softball and am curious as to why we play with the balls that we do. This experiment determined what ball was the most efficient over others used by other leagues. By studying what balls were best at different speeds we could determine why certain balls were selected over others in certain leagues.

Title: **The Fat Bike Ski Adapter**
Presenter: **Lazarus Porter**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Christopher Benshoof**

Fat bikes have been around for a long time and have been the best way to bike in the winter. But my idea was to improve some of the major flaws of fat bikes and make a ski adapter to replace the front tire.

Title: **The Impact of a Yellow Light Warning System on Driver Decision to Enter Intersection**
Presenter: **Hannah Knott**
School: **Austin E. Lathrop High School, Fairbanks, Alaska**
Teacher: **Christopher Benshoof**
Mentor: **Christopher Benshoof**

Two traffic intersections in Fairbanks, Alaska, were studied to determine whether a flashing warning sign, alerting drivers to an impending yellow light, decreased the frequency of drivers entering the intersection during a yellow light. The study also compared whether distance from the intersection impacted drivers' decision to go through the intersection after the yellow light. The results indicate that the flashing yellow lights significantly decreased the number of drivers who entered the intersection after the yellow light. The distance the vehicle was from the intersection was also a significant factor. Drivers were more likely to go through the intersection during a yellow light if they were less than thirty meters from the intersections. Yellow flashing lights did, however, decrease the number of drivers who were less than thirty feet from the intersection and proceeded through the intersection.

Thirty-Fourth UAF Annual Meeting
Alaska Statewide High School Science
Symposium (ASHSSS)

Alphabetical
PARTICIPATING STUDENT LISTING
By Name, School & Presentation Title

Name	School	Paper Title
TBD	TBD	TBD

AELHS:	Austin E. Lathrop High School, Fairbanks, Alaska
WVHS:	West Valley High School, Fairbanks, Alaska

Second Floor Reichardt Building Locator Map

