



# WA 2020

## World Aquaculture 2020

### NEXT GENERATION AQUACULTURE

**INNOVATION AND SUSTAINABILITY WILL FEED THE WORLD**

### December 5-8, 2021

Singapore EXPO Convention & Exhibition Centre  
and MAX Atria

The Annual International Conference & Exposition of  
World Aquaculture Society

Asian Pacific Aquaculture 2020  
- Annual Meeting of Asian Pacific Chapter, WAS

Hosted by Singapore Food Agency

Conference Sponsors

Temasek Polytechnic, Nanyang Technological University  
National University of Singapore, James Cook University  
Republic Polytechnic

3rd International Symposium on Perch and Bass



WAS Premier Sponsors



WA2020 Partner



@WA2020



Policy Partnership  
on Food Security



@Wa2020



WASAPC

Associate Sponsors

Aquaculture Engineering Society  
International Association of Aquaculture Economics & Management  
WorldFish

**WA2020  
will be an  
In-Person Event!  
Please get  
vaccinated  
so we can have  
a free-flowing  
meeting!**





# WORLD AQUACULTURE VISITS SINGAPORE FOR THE FIRST TIME

WORLD AQUACULTURE 2020 will be held in Singapore with involvement from countries throughout the Asian-Pacific region and around the world. Aquaculture is rapidly growing in the Asian-Pacific region and increasingly being integrated into the Singapore food systems; therefore 2020 is the perfect time for the world aquaculture community to focus on Singapore.

A major international trade show at WORLD AQUACULTURE 2020 is the place to learn about the latest aquaculture technologies presented by exhibitors from around the world.

***Stay in touch with the program developments for  
WORLD AQUACULTURE 2020 through our Web Page at: [www.was.org](http://www.was.org)***

## FANTASTIC TOURIST OPPORTUNITIES

Singapore is among the world's top cities for tourism. A gateway to Asia and beyond, Singapore is a cosmopolitan city and a melting pot of different cultures. Singapore is home to a vibrant arts and entertainment scene, lively dining and drinking spots, various must-see attractions and the famed shopping district, Orchard Road. Singapore is also well known as a Garden City with world-class attractions and skyscrapers set amidst lush greenery. The 150-year-old Singapore Botanic Gardens – Singapore's first UNESCO World Heritage Site - is located a mere five minutes away from the shopping district.

## SPECIAL PRODUCER PROGRAM

World Aquaculture 2020 will have many special Producer Sessions to address Producer's concerns from around the Asia-Pacific region.



# TECHNICAL PROGRAM COVERS THE LATEST RESEARCH

Sessions and workshops at World Aquaculture 2020 will cover all aspects of aquaculture in the Asia-Pacific region as well as the rest of the world. Sample topics will include:

Abalone	Energy-alternative sources and conservation	Plankton Culture
Algae and macrophytes	Engineering	Policy & Regulations
Amphibian and Reptile Aquaculture	Financing and investment	Polyculture
Animal health and Welfare	Finfish Broodstock Maturation	Pond Culture
Aquaponics and Integrated Aquaculture- Agriculture Systems	Fish Health	Prebiotics and Probiotics
Aquatic veterinary health capacity	Fish Meal and Oil (IFFO)	Processing Technology
Arid land Aquaculture	Flatfish	Product Quality
Barramundi, Seabass & Seabream	Food Safety, Inspections and Audits	Production systems
Bio-floc Systems	Food security	Raceway Systems
Biosecurity	Freshwater Species - General	Recirculating Systems
Biotechnology	General Aquaculture	Reservoir based and Lake Aquaculture
Breeding & Genetics	Grouper & Snapper	Salmonids
Cage-culture	Hatchery & Larvae Management	Scallops
Carpet Shells	Hatchery and Nursery	Sea cucumbers
Carps	Immunology	Sea urchins
Catfish	Information Technology in Aquaculture	Seafood & Health (GILLS)
Certification and legislation	Innovation and High Techs	Seaweeds and Algae
Clams (including Giant Clams)	Integrated Multi-trophic Aquaculture	Shrimp Farm Design and Management
Climate change, adaptation, resilience	Investment in Aquaculture	Shrimp Feeding and Nutrition
Cobia	Korean Aquaculture Session	Shrimp Genetics, Broodstock and Hatchery Management
Coldwater Species - General	Marketing & Trade	Shrimp pathology and biosecurity
Country Specific Sessions (eg 2008 Norway)	Milkfish	Snappers
Crabs & Lobsters	Mollusc Broodstock and Hatchery	Socioeconomics
Crayfish & Freshwater Prawn	Mollusc Cultivation	Spatial Planning, Regulation and Zoning
Development, Welfare and Poverty Alleviation (AwF)	Mulletts	Standards & Certification
Diseases	Mussels	Sturgeons
Drugs and Chemotherapeutics	Nutrition & Feed	Sustainable Development of Aquaculture
Economics & Management	Ocean acidification	Tilapia
Ecosystems approach	Octopus and Cuttlefish	Trade
Education, Extension, Technology Transfer & Workforce Development (AquaEd)	Offshore Aquaculture	Trouts
Eels	Omics tools for Aquaculture	Tuna
Embryology	Organic Aquaculture	Urban aquaculture
Emerging Issues	Ornamentals	Value Chain Development
Emerging Species	Other Marine Fish	Warm water Species – General
Enhancement, Stocking & Ranching	Oyster	Wastage Utilisation
Environment and Biodiversity and Climate Change	Pacific & Indigenous Aquaculture	Water Quality and Usage
	Pangasius, Clarias & Ictalurus	Women in Aquaculture
	Pearl and Queen Conch Culture	Yellowtails, Amberjacks, etc
	3rd International Symposium on Perch and Bass	Zebrafish
	Physiology, Morphology & Histology	

## YOUR FULL CONFERENCE REGISTRATION INCLUDES:

- 👤 Admission to all sessions, seminars and the trade show.
- 👤 Admission to the Receptions.
- 👤 Conference bag and Show Directory(except for spouse)
- 👤 Refreshment Breaks and Cash Bar Happy Hour
- 👤 Students receive the full registration package plus the Student Reception.  
To qualify for the student rate, a copy of your student I.D. is required.
- 👤 Only pre-registered attendees are guaranteed materials



FOR MORE INFORMATION:

**World Aquaculture 2020  
Conference Manager**

**P.O. Box 2302 • Valley Center, CA 92082 USA**

**Tel: +1-760-751-5005 • Fax: +1-760-751-5003**

**Email: [worldaqua@was.org](mailto:worldaqua@was.org)**

**[www.was.org](http://www.was.org)**

**REGISTER EARLY AND SAVE!**



# CALL FOR PAPERS – DEADLINE: July 6, 2021

**WORLD AQUACULTURE 2020 encourages the submission of high quality oral and poster presentations.** We strongly encourage authors to consider poster presentations because poster sessions will be an integral part of the program. Papers submitted for “oral presentation only” may not be accepted as oral presentations due to the limited number of available time slots. **All abstracts must be in English – the official language of the conference.**

Each oral presenter shall be entitled to no more than 15 minutes for a presentation, plus 5 minutes for questions. Authors of studies involving proprietary products or formulations should present this information in workshops or the trade show. Oral presentations should use Power Point. Slides, overhead projectors and video players will not be available or allowed.

**All presenters are required to pay their own registration accommodation and travel expenses.**

**WORLD AQUACULTURE 2020 cannot subsidize registration fees, travel or hotel costs.**

**No Abstract Book will be printed – an Abstract Book will be available online.**

## INSTRUCTIONS FOR PREPARATION OF ABSTRACTS

Expanded Abstract Format - Please refer to the sample.

- 1. TITLE OF PAPER:** The abstract title is printed in CAPITAL LETTERS, with the exception of scientific names which should be Upper/lower case and italicized (see example). Scientific names should not be preceded or followed by commas or parentheses or other markings.
- 2. AUTHOR(S):** The first name should be the presenting author. Use \* after the presenting author. Type in upper/lower case.
- 3. ADDRESS AND EMAIL:** Type only the presenting author's institution, address and email. Type in upper/lower case.
- 4. MAXIMUM LENGTH:** One Page
- 5. PAGE SIZE:** Standard 8.5 x 11 inch paper (portrait)
- 6. MARGINS:** 1-inch margin throughout (left/right/top/bottom)
- 7. SPACING:** Single spaced
- 8. PARAGRAPHS:** Paragraphs should be separated by a blank line and should not be indented.
- 9. FONTS:** Character fonts should be 12 point type.
- 10. FIGURES & TABLES:** Figures and tables are highly recommended. They should be reduced to the appropriate size for a one page abstract and should be clearly readable at the reduced size. The reduced figures and tables should be included in the abstract in camera-ready form.

1 inch margin (2.54 cm)

EVALUATION OF JUVENILE AUSTRALIAN RED CLAW CRAYFISH *Cherax quadricarinatus* FED PRACTICAL DIETS WITH AND WITHOUT SUPPLEMENTAL LECITHIN AND/OR CHOLESTEROL

Laura A. Muzinic\*, Kenneth R. Thompson, Tracey Christian, Carl D. Webster, Lukas Manomaitis, and David B. Rouse

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Kentucky State University  
Frankfort, KY 40601  
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Red claw crayfish (*Cherax quadricarinatus*) are one of more than a hundred species of Australian freshwater crayfish. However, because of its rapid growth rate, ease of spawning, wide tolerance to low dissolved oxygen tolerance, and lack of a larval stage, red claw may be the best candidate for aquaculture in the United States. Red claw are only being investigated as an aquaculture species in this country and little information exists on their nutritional requirements and practical diet formulations. Many crustaceans require lecithin and cholesterol to be added to their diet, these two nutrients are usually expensive; however, lecithin and cholesterol are very expensive. Since diet costs can be as much as 70% of the total expenses for an aquaculture enterprise, it is imperative that the least expensive diet be used. The present study was conducted to determine if cholesterol or lecithin needs to be added to a practical diet for red claw crayfish.

An 8-week feeding trial was conducted in a recirculating aquaculture system with newly-hatched juvenile (mean weight of 0.2 g) red claw, each stocked in individual plastic mesh culture units. Individual units were placed within fiberglass tanks, each containing an aerator and water line. Water was recirculated through mechanical and mechanical filters. Water temperature was maintained at 27-29°C and lighting was provided by overhead fluorescent ceiling lights on a 12-hour light:dark cycle. Ammonia, nitrite, nitrate, oxygen, temperature, alkalinity, chloride, and pH were measured three times per week. The growth performance was to examine the effects of growth performance of newly-hatched juvenile red claw when fed four practical diets with or without cholesterol and lecithin. Other practical diets included menhaden fish meal, soybean meal, shrimp meal, wheat flour, vitamin and mineral mix, pellet binder, cod liver oil, and corn oil (Table 1).

After 8 weeks, red claw crayfish fed a practical diet without cholesterol (Diet 3) had significantly ( $P < 0.05$ ) lower final weight, percentage weight gain, and specific growth rate (SGR) compared to crayfish fed all other diets (Table 2). These results indicate that a practical diet containing 2% cod liver oil and 1% corn oil and having no lecithin appears to be sufficient and that lecithin may not be necessary for juvenile red claw diets.

1 inch margin (2.54 cm)

	Diet			
	1	2	3	4
Menhaden FM	25.0	25.0	25.0	25.0
Soybean Meal	35.0	35.0	35.0	44.5
Lecithin 0.5	0.0	0.5	0.0	
Cholesterol	1.0	1.0	0.0	0.0
Other	38.5	39.0	39.5	30.5

	Diet			
	1	2	3	4
Final weight (g)	6.97a	6.00a	3.64b	5.11a
Weight gain (%)	3384a	2897a	1717b	2454a
SGR (%/day)	5.74a	5.66a	4.68b	5.41a
Survival (%)	76.0	64.0	56.0	80.0

1 inch margin (2.54 cm)

1 inch margin (2.54 cm)

11 inches long (27.94 cm)

8.5 inches wide (21.6 cm)

## PLEASE SUBMIT YOUR ABSTRACT ONLINE

**Submit your abstract via the internet at the meeting website.**  
**Follow the complete instructions on the website for online submission.**

**www.was.org**

**If you are unable to submit your abstract online, contact the Conference Manager for alternative methods at:**

**worldaqua@was.org**





# WORLD AQUACULTURE 2020

## December 5 - 8, 2021

Register online at: [www.was.org](http://www.was.org)

Return address for payments in USD:  
Conference Manager  
P.O. Box 2302  
Valley Center, CA 92082 USA  
Tel: +1 760 751 5005  
Fax: +1 760 751 5003  
Email: [worldaqua@was.org](mailto:worldaqua@was.org)

**Online registration is preferred at [www.was.org](http://www.was.org) OR fax or mail both sides with payment. Use one form per person.**

PLEASE PRINT CLEARLY OR TYPE ALL REQUESTED INFORMATION

**BADGE INFORMATION:** (As you want your name badge to read – No titles, please)

First Name \_\_\_\_\_ SURNAME (FAMILY NAME) \_\_\_\_\_

Company or Institution \_\_\_\_\_  
(Limited to 40 Letters & Spaces)

City \_\_\_\_\_ State/Prov \_\_\_\_\_ Country \_\_\_\_\_

**MAILING INFORMATION:** Email \_\_\_\_\_  
(*please* include email address)

Postal Address \_\_\_\_\_

City \_\_\_\_\_ State / Prov \_\_\_\_\_ Postal Code \_\_\_\_\_ Country \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Title: (circle one) Dr. Mr. Ms. Mrs.  
(Include country and city code) (Include country and city code)

**REGISTRATION FEES:** In order to receive the discount rates as listed below, this form and payment must be received by the date listed. See brochure for what is included in registration fees.

TYPE OF REGISTRATION	Register by Oct. 15, 2021	Register by Nov. 14, 2021	Register after Nov. 14, 2021	* To qualify for Member Rate you <u>must</u> complete the Association Memberships section on the reverse side.  ● ● ● ● ● ● ● ● Trade Show is <u>included</u> in the Full Conference Registration Rate.
<b>FULL CONFERENCE &amp; TRADE SHOW</b> In order to receive the Pre-Registration discount rate, this form and payment must be received by the date above				
<b>WAS/CHAPTER MEMBER RATE*</b> <input type="checkbox"/> US\$ 495	<input type="checkbox"/> US\$ 495	<input type="checkbox"/> US\$ 595	<input type="checkbox"/> US\$ 695	● ● ● ● ● ● ● ● Trade Show is <u>included</u> in the Full Conference Registration Rate.
<b>WAS/CHAPTER STUDENT MEMBER RATE*</b> Include copy of Student I.D. <input type="checkbox"/> US\$ 295	<input type="checkbox"/> US\$ 295	<input type="checkbox"/> US\$ 295	<input type="checkbox"/> US\$ 350	
<b>Non-Member Rate</b> <b>Student Non-Member Rate</b> Include copy of Student I.D. <i>You can join WAS on the reverse side and use the Member Rate.</i> <input type="checkbox"/> US\$ 590 <input type="checkbox"/> US\$ 395	<input type="checkbox"/> US\$ 590 <input type="checkbox"/> US\$ 395	<input type="checkbox"/> US\$ 690 <input type="checkbox"/> US\$ 395	<input type="checkbox"/> US\$ 790 <input type="checkbox"/> US\$ 445	
<input type="checkbox"/> <b>Spouse Rate</b> – <i>must accompany a full registration</i> Name _____ <input type="checkbox"/> US\$ 385	<input type="checkbox"/> US\$ 385	<input type="checkbox"/> US\$ 485	<input type="checkbox"/> US\$ 585	<b>TOTAL REGISTRATION FEE</b> US\$ _____

**TRADE SHOW PASS (Trade show pass is included with the Full Conference Registration)**  
Good for 3 days admission to exhibits only – Dec. 6, 7, 8  US\$ 50 **TOTAL TRADE SHOW PASS** US\$ \_\_\_\_\_

**WORKSHOPS & TOURS – TBA**

**TOTAL** US\$ \_\_\_\_\_

**MEMBERSHIP DUES** – Enter amount from Membership Application on other side if applicable. **TOTAL MEMBERSHIP DUES** US\$ \_\_\_\_\_

**Do not mail registration after Nov. 14, 2021 or fax after Nov. 14. After Nov. 14, bring this form with you to register at the show.**

**➔ TOTAL AMOUNT US\$ \_\_\_\_\_**

**Registration Confirmation and Receipt will be emailed after processing.**

**CANCELLATION POLICY:** Cancellation of registration must be received - in writing - no later than Nov. 1, 2021. Refunds for registration fees will be subject to a 20% handling fee. Refunds are processed after the conference. No refund will be made for cancellations received after Nov. 1, 2021 or for "no shows". After Nov. 1, 2021, no refunds will be made for professional or personal emergencies, flight cancellations, denied visa, weather related cancellation or other travel emergencies. Fees for memberships are non-refundable.

**PAYMENT METHOD:** All fees must be paid to the order of **WORLD AQUACULTURE 2020**. For bank transfer details, contact us.

Check # \_\_\_\_\_  Visa  Mastercard  American Express  Discover  Diners Club

Card # \_\_\_\_\_ Expiration Date \_\_\_\_\_

Name on Card \_\_\_\_\_ Date \_\_\_\_\_ Signature \_\_\_\_\_

Credit Card Billing Address \_\_\_\_\_

# REGISTRATION FORM - SIDE 2

Name \_\_\_\_\_

**ASSOCIATION MEMBERSHIPS:** Please check all boxes for associations for which you are a current member. Membership in any of those associations qualifies you for the Member Rate\* on the Registration Fees. You can join an association at any time before registering to qualify for the Member Rate.

**MEMBERSHIPS:**    WAS    USAS    APC    Korean    LACC    African Chapter

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**AFFILIATE MEMBERSHIPS:**

- |                                                                                      |                                                                            |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <input type="checkbox"/> Aquabio                                                     | <input type="checkbox"/> Indonesian Aquaculture Society                    |
| <input type="checkbox"/> Aquaculture Association of Canada                           | <input type="checkbox"/> Korean Aquaculture Society                        |
| <input type="checkbox"/> Aquaculture Association of South Africa                     | <input type="checkbox"/> Korean Society of Fisheries and Sciences (KOSFAS) |
| <input type="checkbox"/> Aquaculture Without Frontiers                               | <input type="checkbox"/> Malaysian Fisheries Society                       |
| <input type="checkbox"/> Asian Fisheries Society                                     | <input type="checkbox"/> Sociedad Brasileira de Acuicultura                |
| <input type="checkbox"/> China Society of Fisheries                                  | <input type="checkbox"/> Society of Aquaculture Professionals (India)      |
| <input type="checkbox"/> Egyptian Aquaculture Society                                | <input type="checkbox"/> South African Aquaculture Society                 |
| <input type="checkbox"/> European Aquaculture Society                                | <input type="checkbox"/> Spanish Aquaculture Association (SEA)             |
| <input type="checkbox"/> Global Aquaculture Alliance                                 |                                                                            |
| <input type="checkbox"/> IAFI The International Association of Seafood Professionals |                                                                            |

**MEMBERSHIP APPLICATIONS**    NEW APPLICATION    RENEWAL

**WORLD AQUACULTURE SOCIETY (WAS) APPLICATION**   [www.was.org](http://www.was.org)

For details on the different types of memberships and options, please contact the WAS home office at

Tel: +1-225-578-3137   Fax: +1-225-578-3493   Email: [judya@was.org](mailto:judya@was.org)

**MEMBERSHIP CATEGORY: (Indicate only one)**

- Individual** (Electronic JWAS) (USD 65/yr) Applies to an individual only
- Individual** (E Access) (USD 45/yr) Applies to an individual only
- Student** (Electronic JWAS) (USD 45/yr) (Copy of Student ID or Signature of Professor required)
- Sustaining** (Electronic JWAS) (USD 105/yr) Applies to any one individual from a company
- Corporate** (Electronic JWAS) (USD 255/yr) Allows all employees of one company to attend meeting at Member Rate
- Lifetime** (Electronic JWAS only) (USD 1000 with no chapter) Applies to an individual only
- Lifetime** (Electronic JWAS only) (USD 1100 with one chapter) Applies to an individual only

**CHAPTER OPTIONS:**

One chapter included in membership. Mark the chapter you choose.

- Africa**
- Asian Pacific**
- Korea**
- Latin American/Caribbean**
- United States (USAS)**
- None** (deduct USD 5)

You can add extra Chapters for USD 5

*Fees for memberships are non-refundable.*

**Total Amount for WAS Membership**   **USD** \_\_\_\_\_  
*Please enter this amount under "Membership Dues" section on opposite side of this form.*

*For membership in other associations, please contact them directly.  
If you need a phone number, contact the Conference Manager (+1-760-751-5005).*



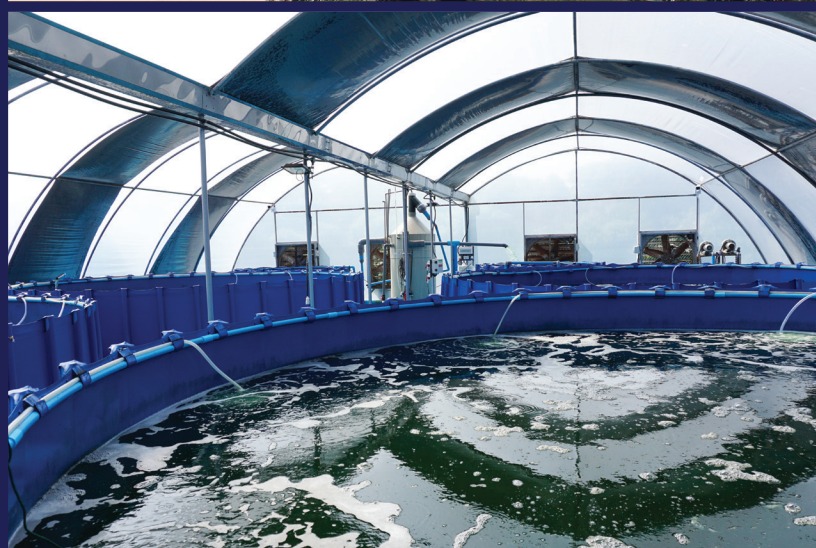
## MANY OPPORTUNITIES FOR FARM TOURS

Some very special tours will be arranged. Details to be provided later – check our website for updates.

## HOTELS

We have arranged a wide range of quality accommodations at special rates. Please check the website for hotel details.

TRADE SHOW SCHEDULE		
<b>DEC. 6</b> 10:00 - 19:00	<b>DEC. 7</b> 10:00 - 19:00	<b>DEC. 8</b> 10:00 - 17:40





# TENTATIVE SCHEDULE

## Sunday, December 5

Registration Open	Noon – 18:00
Exhibitor Move-in	Noon – 18:00
Poster Set-up	13:00 – 17:30
Welcome drink	17:00 – 19:00

## Monday, December 6

Registration Open	7:30 – 17:00
Welcome and award	9:00 – 09:15
Keynote Speech by GOH	9:15 – 09:45
Plenary	9:45 – 10:15
Opening ceremony	10:15 – 10:45
Exhibitor Move-in	8:00 – 10:00
Poster Set-up	8:00 – 10:00
Official opening exhibition	10:45 – 10:50
Refreshment Break	10:45 – 11:15
Trade Show & Posters Open	10:00 – 19:00
Sessions	11:15 – 12:55
Lunch (On your own)	12:55 – 14:00
Sessions	14:00 – 15:40
Refreshment Break	15:40 – 16:00
Sessions	16:00 – 17:40
Happy Hour & Poster Session	17:40 – 19:00
Student Reception	19:00 – 21:00

## Tuesday, December 7

Registration Open	7:30 – 17:00
Sessions	9:00 – 10:40
Refreshment Break	10:40 – 11:00
Trade Show & Posters Open	10:00 – 19:00
Sessions	11:00 – 12:40
Lunch (On your own)	12:40 – 14:00
Sessions	14:00 – 15:40
Refreshment Break	15:40 – 16:00
Sessions	16:00 – 17:40
Happy Hour & Poster Session	17:40 – 19:00
WAS-APC Members meeting	17:40 – 18:40
President's Reception	19:00 – 21:00

## Wednesday, December 8

Registration Open	7:30 – 17:00
Sessions	9:00 – 10:40
Refreshment Break	10:40 – 11:00
Trade Show & Posters Open	10:00 – 16:00
Sessions	11:00 – 12:40
Lunch (On your own)	12:40 – 14:00
Sessions	14:00 – 15:40
Refreshment Break	15:40 – 16:00
Sessions	16:00 – 17:40
Poster Out take down	17:40 – 18:00
Exhibit Move-out	17:40 – 22:00

