

**Committee of Age Reading Experts**

**2019 Committee Report**

**and**

**Executive Summary of the**

**Twentieth Biennial Meeting April 9-12, 2019**

Prepared for the Sixtieth Annual Meeting of the  
Technical Subcommittee of the Canada-USA Groundfish Committee

**April 23 – 24, 2019**



Prepared by  
Kevin McNeel  
2017-2019 CARE Chair

Alaska Department of Fish & Game  
Division of Commercial Fisheries  
Age Determination Unit Supervisor  
10107 Bentwood Pl  
Juneau, Alaska  
99801

## A. CARE Overview

### 1. History

The Committee of Age-Reading Experts (CARE) is a subcommittee of the Canada-USA Groundfish Committee's Technical Subcommittee (TSC) charged with the task to develop and apply standardized age determination criteria and techniques and operate within the Terms of Reference, approved by the TSC in 1986, and the CARE Charter, developed in 2000 and approved by the CARE in 2004.

### 2. Report Period

This report covers the work period of January 1 – December 31, 2018; however, to promote timely reporting of work and recommendations occurring during the recent CARE conference, an Executive Summary of the 20th CARE conference held April 9-12, 2019 is included here as part of the TSC report. Current officers through June 30, 2019 (elected at April CARE 2017 Meeting) are:

- Chair – Kevin McNeel (ADF&G-Juneau)
- Vice-Chair – Barbara Campbell (CDFO)
- Secretary – Nikki Atkins (NWFSC)

The Secretary will prepare a draft of the minutes from the recent CARE meeting to be distributed to CARE members for review and subsequent approval prior to the end of his term. Due to the proximity of the TSC meeting following the CARE meeting, it is necessary to for the Chair to prepare the report to TSC to include proceedings of the recent meeting as an executive summary. Finalized minutes will be included in the annual 2019 report.

### 3. 2018 Annual Report

- Initial CARE 2019 Meeting Announcement sent by CARE Chair to CARE members on July 2, 2018 to establish themes for CARE and the venue. On November 2, 2018 an overview of the 2019 meeting logistics, agenda, and workshops was given.
- The CARE Vice Chair contacted CARE members to finalize all age structure exchanges. Ten exchanges were initiated in 2018: one big skate exchange initiated by NWFSC-PSMFC, two canary rockfish exchanges initiated by WDFW and NWFSC, one longnose skate initiated by AFSC, one Pacific cod exchange by ADF&G-Juneau, four sablefish exchanges initiated by NWFSC, AFSC, ADF&G-Juneau, and CDFO, and one yelloweye rockfish exchange initiated by ADF&G-Homer (Table 3).
- Jon Short (AFSC) and Nikki Atkins (NWFSC) updated the CARE website for current info, CARE officers, and 2017 CARE Meeting minutes.

### 4. CARE Conference – Executive Summary

CARE meets biennially for a conference that usually lasts three days. Conferences typically consist of one and a half “business” days and one and a half days for a hands-on calibration workshop at microscopes to review and standardize age reading criteria with any extra time scheduled for a specific focus group or workshop.

- Overview:** The most recent biennial CARE Conference was held in Seattle, WA, April 9-11, 2019 at the NOAA Western Regional Center at the Alaska Fisheries Science Center (AFSC), Sand Point facility, and hosted by the Age and Growth AFSC staff (Appendix I). The conference was attended by 36 CARE members (Table 1) from seven participating agencies: ADF&G (3), AFSC (17), CDFO (3), IPHC (3), NEFSC (1), NWFSC/PSMFC (4), ODFW (2), and WDFW (3). Following the CARE conference, AFSC hosted a two-day FT-NIRS workshop (Appendix II). The next CARE Conference in 2021 will be held prior to the TSC meeting in April in Newport, Oregon. The following officers were elected at the April 2019 meeting and will take office July 1, 2019:

- Chair – Delsa Anderl (AFSC)
- Vice-Chair – Andrew Claiborne (WDFW)

- Secretary – Nikki Atkins (NWFSC-PSMFC)

**b. Business Session Highlights:**

**i. Scientific presentations:**

An unofficial Call for Presentations and Posters for the 2019 CARE Conference was sent to members on November 2, 2018 (Appendix II). Submissions were requested to address current research and the 2018 TSC recommendations: yelloweye rockfish, differentiating cryptic species, and evaluating machine reading of otoliths.

Abstracts were due to the CARE Chair by March 8, 2019. There were two oral presentations submitted for the scientific presentation session. (Appendix III).

Two oral presentations in PowerPoint format were given during the CARE meeting:

1. Andrew Claiborne, Results of the yelloweye rockfish exchanges: comparison of age determinations from Alaska, British Columbia, and the coasts of Washington and Oregon
2. Chris Hinds, Importance of juvenile sablefish growth and methods of estimation

**ii. Agency Reports:**

AFSC (Thomas Helser), CDFO (Steve Wischniowski), IPHC (Joan Forsberg), ADF&G (Kevin McNeel), NWFSC-PSMFC (Patrick McDonald), WDFW (Andrew Claiborne), and ODFW (Lisa Kautzi) provided reports summarizing and updating agency activities, staffing, organization, new species and projects. There was no representative at CARE from SWFSC, CDFG, or ADF&G- Homer and Kodiak, but a report was sent from Kodiak. Details from agency reports will be available in the finalized CARE minutes, published to the CARE website by year's end.

**iii. Working Groups:**

**a) Yelloweye rockfish:**

Hands-on microscope work and calibration summary  
Goal: Yelloweye rockfish ageing and reviewing exchange data  
Tuesday, April 9, 2019

Participants:

Joanne Groot (CDFO)  
Michele Mitchell (CDFO)  
Chris Hinds (ADF&G)  
Jodi Neil (ADF&G)  
Sandra Rosenfield (WDFW)  
Andrew Claiborne (WDFW)  
Patrick McDonald (NWFSC-PSMFC)  
Kevin McNeel (ADF&G)

Age readers from CDFO, WDFW, ADF&G-ADU, and PSMFC aged specimens from the radiocarbon sample using images. Specific features discussed were identification of the 1st, preferred aging axis, edge interpretation, splitting vs. banding of fine annuli in older specimens, and the importance of tracing annuli from the surface onto the reading surface to help interpret noise.

**b) Pacific cod**

Hands-on microscope work and calibration summary  
Goal: Pacific cod ageing and calibration  
Tuesday/Wednesday, April 9/10, 2019

Participants:  
Kevin McNeel (ADF&G)  
Jodi Neil (ADF&G)  
Chris Hinds (ADF&G)  
Delsa Anderl (AFSC)  
John Brogan (AFSC)  
Dustin Nadjkovic (AFSC)  
Beth Matta (AFSC)  
Kali Stone (AFSC)  
Sandra Rosenfield (WDFW)

The group reviewed annotated images of Pacific cod otoliths from the 2019 age structure exchange to corroborate ages and resolve discrepancies. The group went over the spacing of the first two annuli, tracking annuli, edge growth and preferred reading axes. Also, the results of AFSC's  $^{18}\text{O}$  study were reviewed and the group discussed the common check that occurs between the first and second annuli. Delsa Anderl also went over some of the work and collaboration that AFSC was doing with Korean age readers.

**c) Sablefish:**

Hands-on microscope work and calibration summary  
Goal: Sablefish ageing and reviewing exchange data  
Wednesday, April 10, 2019

Participants:  
Kevin McNeel (ADF&G)  
Jodi Neil (ADF&G)  
Chris Hinds (ADF&G)  
Delsa Anderl (AFSC)  
John Brogan (AFSC)  
Joanne Groot (CDFO)  
Michele Mitchell (CDFO)  
Patrick McDonald (NWFSC-PSMFC)  
Jamie Hale (NWFSC-PSMFC)  
Nikki Atkins (NWFSC-PSMFC)  
Dustin Nadjkovic (AFSC)  
Tyler Johnson (NWFSC-PSMFC)  
Kali Stone (AFSC)

The group reviewed the results and annotated images of the four sablefish otolith age structure exchanges. All agencies confirmed that they use the surface of the otolith to age, but AFSC uses the unburned surface. ADF&G uses a 2mm measurement criteria for the first, which resulted in an additional year on some otolith ages. Everyone reviewed annotations and resolved some discrepancies from the age structure exchange.

Thirty known-age sablefish were presented at CARE. The sablefish working group decided that the unprocessed and broken and burned otoliths should be imaged and

mixed into a larger sample to prevent ages from being biased. These will be sent to all participating agencies following CARE. Some members of the working group also reviewed images of known-age otoliths from the historic collections for calibration.

**d) Longnose skate:**

Hands-on microscope work and calibration summary

Goal: Big and longnose skate ageing

Wednesday, April 10, 2019, 4:00 pm to 5:00 pm

AFSC, Seattle, WA, Imaging Room 1110

Participants:

Morgan Arrington (AFSC, University of Washington)

Beth Matta (AFSC)

Patrick McDonald (NWFSC-PSMFC)

Tyler Johnson (NWFSC-PSMFC)

Chris Gburski (AFSC)

The group began the skate ageing session viewing thin section images from vertebral centra on the imaging PC monitor, prepared by Morgan. The US West Coast longnose skate (*Raja rhina*) specimen images were acquired with reflected light and image enhanced. We examined discrepancies between the AFSC and NWFSC from the CARE exchange conducted in winter 2018. Early growth years (0-1 years old) were viewed for consensus ageing. The intermedialia, corpus calcarea arms, edge, birthmark increment, translucent versus opaque growth zones, and total length were used for age determination. For West Coast collected longnose skate, it was surmised that the birthmark is closer in distance to the focus when compared to longnose skate collected from the Gulf of Alaska. To explain this difference, water temperature and timing for embryo development within the skate egg case may vary from these two regions with variances in life history events. Edge growth and seasonality (summer vs. fall collected) was discussed to estimate age and edge growth. One specimen was subsequently ranged due to the difficulty in age interpretation. Skate maturity stage (mature vs. immature) with respect to how it may affect appearance of growth zones was also discussed. Ontogenetic shift in diet may affect growth and maturity stage timing. Age 1-2 years old were also viewed. The 'young skate' section for 'Longnose Skate Ageing Procedures' from the CARE Ageing Manual was referenced to assist with ageing. Tyler showed West Coast collected big skate (*Beringraja binoculata*) unstained vertebral thin sections (n = 5) that we viewed with reflected light. Both age 1 or 2-year-old and age 3 or 4-year-old specimens were looked at for a consensus age. How to interpret growth patterns including splitting versus grouping, translucent growth zones, spacing, pre-annular checks, and thin section thickness were discussed. There were 5 participants from AFSC and NWFSC.

**e) Shortspine thornyhead:**

Hands-on microscope work and calibration summary

Goal: Discuss otolith structure exchange that between AFSC and ADU (initiated by AFSC) using unburned thin-sectioned specimens.

Thursday April 11, 2019 CARE

Participants:

Jodi Neil (ADF&G-Juneau)

Charles Hutchinson (AFSC)

Todd TenBrink (AFSC)

Both agencies annotated the images and we discussed these annotations as well as looked at a few additional unburned thin-sectioned specimens and aged and annotated them as a group. The results of the annotated structure exchange specimen suggested a slightly older pattern interpretation by AFSC age readers in comparison to the ADU age readers. During the working group we discussed the best counting pathway to use (e.g. sulcus vs edge) and how to interpret the early years. Shortspine thornyhead growth patterns are noisy and checky in the early years so all readers agreed that using the surface if possible and the sulcus was the best way to interpret this noise. A concern brought up by the AFSC age readers was whether darker areas in older specimens were compressed zones or fast growth larger zones and how to interpret these zones. In unburned thin sections these zones appear as translucent bands that are very difficult to see individual annuli. We discussed the possibility that for these older specimens maybe the thin section was not thin enough to be able to clear up these translucent compressed areas.

We discussed the possibility of conducting a larger paired-structure exchange that would include both a broken and burned half and an unburned thin-sectioned half from the same specimens, with both agencies contributing otoliths for the exchange. At the end of the meeting, Charles proposed AFSC put together a list of questions and goals they would like to achieve in the next structure exchange as they were the agency that initiated the last exchange to address concerns they had.

**f) Rougheye/Blackspotted/Shortraker Rockfish:**

Review and hands on work summary

Goal: Discuss agency progress and compare shape analysis results

Thursday April 11, 2019 CARE

Participants:

Charles Hutchinson (AFSC)

Betty Goetz (AFSC)

Stephen Wischniowski (CDFO)

Kevin McNeel (ADF&G)

All agencies worked together to provide updates, collect morphometric and shape data, and compare model results at CARE. Steve Wischniowski provided a sample of rougheye and blackspotted otolith images and Charles Hutchinson created otolith measurements using ImagePro Plus and compared measurements with otolith weight and age to the current AFSC model output. Kevin McNeel created shape estimates and otolith measurements using R and looked for statistical groups and identification error. Each agency is currently working to address specific concerns for identifying these species and a summary was provided to the group (Appendix IV).

**iv. Hands-on Session Highlights and Demonstrations:**

A total of 21 readers reviewed 7 species during the hands-on workshops and, mainly for the purpose of calibration between age readers and agencies. Members aged yelloweye rockfish, Pacific cod, sablefish, longnose skate, and shortspine thornyhead. A demonstration for measuring rockfish otolith with image analysis was demonstrated by Charles Hutchinson (AFSC) and Kevin McNeel (ADF&G). See species aged, participating members, and agencies in Table 2.

**v. Exchanges:**

Kevin McNeel (ADF&G) presented Barb Campbell's (CDFO) updates on CARE exchanges. She reported that there were 13 exchanges in 2017, 10 exchanges in 2018, and four exchanges in 2019. Three of the 2017 and one of the 2018 exchanges were outstanding and needed data to be finalized. Barb also commented that maybe statistical results on invoices was not necessary, that agencies should resolve ages and submit on agency age

**B. CARE Subcommittee (Working Group) Reports – Executive Summary**

There were five active working groups that reported at the 2018 CARE Conference:

- 1. TSC Meeting 2018:** Kevin McNeel (ADF&G) gave an overview of the 2018 meeting in San Jose, California. In the report given to the TSC McNeel gave an update on changes in CARE personnel and our activity and included the 13 age structure exchanges in 2018. He commented that CARE initiated 5 yelloweye exchanges, which directly addresses the 2017 TSC to CARE recommendation to review yelloweye rockfish age pattern criteria. The TSC was interested in near infrared methods to age otoliths and commented on using tag-recapture, known-age sablefish. It was reported that AFSC has been working on evaluating the method for Walleye pollock, Pacific cod, sablefish and sole, that the method may have more potential for some species, and that AFSC is the only center on the west coast with NIR machine.

McNeel reviewed recommendations: the 2017 Recommendation from CARE to TSC is that CARE recognized the TSC to CARE concern over storage media issue and developed the ad-hoc working group to address the issue. The 2017 TSC to CARE recommendation was to investigate yelloweye rockfish age determination criteria; CARE had five age structure exchanges, including bomb-radiocarbon validated specimens, to compare criteria. TSC members proposed to add yelloweye rockfish criteria as a research priority to make it easier to study.

- 2. CARE Website:** Jon Short (AFSC) gave updates on the CARE website. Jon Short showed the new WordPress webpage that is supported by the PSMFC. There new website is missing a lot of content that needs to be moved forward and CARE is looking for people that have time to update the websites. Jon Short is missing some 2015/2016 agency production number summaries and has been waiting to update the website until he has all updates. Jon and Kevin asked CARE members to turn those in as soon as possible
- 3. CARE Forum:** Nikki Atkins (NWFSC) gave an update on the CARE website forum. Nothing has happened on the forum for quite some time. However, with the new host for the website the forum seems like it might be more user friendly. Old posts from the form will be copied and moved into the new forum as “archived” posts so the content won't be lost. Nikki will contact all current users of the forum with the new address and reminders of their usernames so they can log in to the new version.

**C. CARE & TSC Recommendations**

**1. 2019 CARE to CARE**

- a. Recommends the CARE Manual working group (Elisa Russ, Betty Goetz, Jodi Neil) finalize and add the following sections before the 2021 CARE meeting:**
  - i. Lingcod Otolith Ageing Procedures section (is written, needs to be added)**
  - ii. Sablefish Ageing Procedures section (is written, needs to be added)**

- iii. Thin Sectioning Method section – add a section under the General Ageing Procedures (is written, needs to be added)
  - iv. Add section on baking otoliths under General Otolith Ageing Procedures; to be written and finalized
  - v. Ergonomics section including equipment checklist as appendix (is written, needs to be added)
- b. Recommends the Manual working group continue the revision and expansion of the CARE Manual on Generalized Age Determination with the following sections drafted or revised for review and addition of edits to the manual by the 2021 CARE meeting:
- vi. Walleye Pollock Ageing Procedures section (use AFSC manual as starting point); not written
  - vii. Spiny Dogfish Ageing Procedures section – summary of spiny dogfish age determination paper by Dr. Cindy Tribuzio; not reviewed
  - viii. Rockfish Ageing Procedures section; not reviewed
    - 1. Edit to avoid redundancy with Thin Sectioning section;
    - 2. Revise/move some information to General Otolith Ageing Procedures section where appropriate;
  - ix. Remove documentation sections regarding changes to CARE Manual
    - 1. See Recommendation C to post archived editions.
    - 2. Remove 2015 recommendation to add Acknowledgements section.
- c. Recommends the CARE Manual working group submit archived editions of the CARE Manual to the website working group for posting on the CARE website to preserve historical records. Most archived material may be lost, but Betty Goetz offered to retrieve old files.
- d. Recommends that the CARE Forum be updated and added to the new website.
- e. Recommends the CARE searchable publication database be discontinued and an updated version of the current endnote database be supported.
- f. Additional recommendations for the website to be completed prior to the 2019 TSC meeting are as follows:
- i. Add information at the top of the Species Information page to “Check with specific agency about changes in historical techniques”; report that “Methods listed are for most recent reporting year,”
  - ii. Add table for agency contacts with e-mail address of agency leads and information on age readers and species; Add as google doc and have agencies update information by Friday April 12, 2019
  - iii. Update agency production numbers annually (finalize agency updates by April 19, 2019), and
    - 3. Update Species Information page to include new codes;
    - 4. Edits such as consistent capitalization on the Species Information page; find updated species list by Care 2021
  - iv. Agencies should work to provide links to structure inventories to be assessable on the new website before CARE 2021

- g. Recommends that ongoing agency progress toward long term otolith storage issues be documented and distributed to the TSC before the 2020 meeting. Research from the IPHC, CDFO, and AFSC will be summarized and distributed.
- h. Recommend posting list of maximum ages on CARE website and developing quality control processes for new maximum ages including a CARE age structure exchange between appropriate agencies (age structure exchange may be done at CARE meeting to minimize transport and maximize efficiency).
- i. Recommend evaluating and updating the current CARE Age Structure Exchange invoice to potentially exclude quality control statistics and include better notation before CARE 2021.

2. 2019 CARE to TSC

CARE currently has no recommendations for the TSC

2. TSC to CARE 2017/2018

2017

Recommends CARE to review yelloweye aging

2018

- a. CARE did not directly respond to storage recommendations and CARE will carry this recommendation on this year and develop a working group to standardize otolith storage.
- b. TSC Recommends carrying over yelloweye ageing review.
- c. TSC encourages the use of otolith morphometrics to separate out cryptic species and suggests expanding the current working group to expand to other species.
- d. TSC encourages CARE to evaluate the machine reading of otoliths as a valid method (near infrared), concern is that suitable criteria are met.

**Table 1. Attendees of the CARE Conference, April 9-11, 2019, Seattle, Washington, U.S.A.**

Last name	First name	Agency	Location	Country	Email
Hinds	Chris	ADF&G	Juneau	USA	chris.hinds@alaska.gov
McNeel	Kevin	ADF&G	Juneau	USA	kevin.mcneel@alaska.gov
Neil	Jodi	ADF&G	Juneau	USA	jodi.neil@alaska.gov
Anderl	Delsa	AFSC	Seattle	USA	delsa.anderl@noaa.gov
Benson	Irina	AFSC	Seattle	USA	irina.benson@noaa.gov
Brogan	John	AFSC	Seattle	USA	john.brogan@noaa.gov
Gburski	Chris	AFSC	Seattle	USA	christopher.gburski@noaa.gov
Goetz	Betty	AFSC	Seattle	USA	betty.goetz@noaa.gov
Helser	Thomas	AFSC	Seattle	USA	thomas.helser@noaa.gov
Hutchinson	Charles	AFSC	Seattle	USA	charles.hutchinson@noaa.gov
Kastelle	Craig	AFSC	Seattle	USA	craig.kastelle@noaa.gov

Matta	Beth	AFSC	Seattle	USA	beth.matta@noaa.gov
Nadjkovic	Dustin	AFSC	Seattle	USA	dustin.nadjkovic@noaa.gov
Neidetcher	Sandi	AFSC	Seattle	USA	sandi.neidetcher@noaa.gov
Pearce	Julie	AFSC	Seattle	USA	julie.pearce@noaa.gov
Piston	Charlie	AFSC	Seattle	USA	charlie.piston@noaa.gov
Short	Jon	AFSC	Seattle	USA	jon.short@noaa.gov
Stone	Kali	AFSC	Seattle	USA	kali.stone@noaa.gov
TenBrink	Todd	AFSC	Seattle	USA	todd.tenbrink@noaa.gov
Arrington	Morgan	AFSC/ UW	Seattle	USA	morgan.arrington@noaa.gov
Groot	Joanne	CDFO	Nanaimo	Canada	joanne.groot@dfo-mpo.gc.ca
Mitchell	Michele	CDFO	Nanaimo	Canada	michele.mitchell@dfo-mpo.gc.ca
Wischniowski	Stephen	CDFO	Nanaimo	Canada	stephen.wischniowski@dfo-mpo.gc.ca
Forsberg	Joan	IPHC	Seattle	USA	joan@iphc.int
Johnston	Chris	IPHC	Seattle	USA	chris@iphc.int
Rudy	Dana	IPHC	Seattle	USA	dana@iphc.int
McBride	Richard	NEFSC	Woods Hole	USA	richard.mcbride@noaa.gov
Atkins	Nikki	NWFSC	Newport	USA	nikki.atkins@noaa.gov
Hale	Jamie	NWFSC	Newport	USA	james.hale@noaa.gov
Johnson	Tyler	NWFSC	Newport	USA	tyler.johnson@noaa.gov
McDonald	Patrick	NWFSC	Newport	USA	pmcdonald@psmfc.org
Kautzi	Lisa	ODFW	Newport	USA	lisa.a.kautzi@state.or.us
Rasmuson	Leif	ODFW	Newport	USA	leif.k.rasmuson@state.or.us
Claiborne	Andrew	WDFW	Olympia	USA	andrew.claiborne@dfw.wa.gov
Hildebrandt	Anna	WDFW	Olympia	USA	anna.hildebrandt@dfw.wa.gov
Rosenfield	Sandra	WDFW	Olympia	USA	sandra.rosenfield@dfw.wa.gov

**Table 2. 2019 CARE Hands-On Sessions – Species Aged, Participants, and Agency.**

Species	Participants	Agency	Comments
Shortspine thornyhead	Jodi Neil	ADF&G-Juneau	Calibration
	Charles Hutchinson	AFSC	
	Todd TenBrink	AFSC	
Longnose skate	Morgan Arrington	AFSC, UW	Calibration
	Beth Matta	AFSC	
	Patrick McDonald	NWFSC-PSMFC	
	Tyler Johnson	NWFSC-PSMFC	
Sablefish	Chris Gburski	AFSC	
	Kevin McNeel	ADF&G	Calibration
	Jodi Neil	ADF&G	
	Chris Hinds	ADF&G	
	Delsa Anderl	AFSC	

	John Brogan	AFSC	
	Joanne Groot	CDFO	
	Michele Mitchell	CDFO	
	Patrick McDonald	NWFSC-PSMFC	
	Jamie Hale	NWFSC-PSMFC	
	Nikki Atkins	NWFSC-PSMFC	
	Dustin Nadjkovic	AFSC	
	Tyler Johnson	NWFSC-PSMFC	
	Kali Stone	AFSC	
Pacific cod	Kevin McNeel	ADF&G	Calibration
	Jodi Neil	ADF&G	
	Chris Hinds	ADF&G	
	Delsa Anderl	AFSC	
	John Brogan	AFSC	
	Dustin Nadjkovic	AFSC	
	Beth Matta	AFSC	
	Kali Stone	AFSC	
	Sandra Rosenfield	WDFW	
Cabazon	Lisa Kautzi	ODFW	Calibration
	Sandra Rosenfield	WDFW	

**Table 3. CARE age structure exchanges initiated in 2018.**

<b>Exchange ID #</b>	<b>Species</b>	<b>Originating Agency</b>	<b>Coordinator</b>	<b>Participating Agency</b>
18-010	Big skate	NWFSC-PSMFC	Tyler Johnson	AFSC
18-004	Canary rockfish	WDFW	Jennifer Topping	NWFSC
18-005	Canary rockfish	NWFSC	Patrick McDonald	WDFW
18-006	Longnose skate	AFSC	Beth Matta	NWFSC
18-002	Pacific cod	ADF&G-ADU	Jodi Neil	AFSC
18-001	Sablefish	NWFSC	Patrick McDonald	NWFSC, ADF&G-ADU, AFSC, CDFO
18-003	Sablefish	AFSC	John Brogan	NWFSC, ADF&G-ADU, AFSC, CDFO
18-007	Sablefish	ADF&G-ADU	Jodi Neil	NWFSC, ADF&G-ADU, AFSC, CDFO
18-008	Sablefish	CDFO	Barb Campbell	NWFSC, ADF&G-ADU, AFSC, CDFO
18-009	Yelloweye rockfish	ADF&G-Homer	Elisa Russ	ADF&G- ADU

**APPENDIX-I**



**CARE 2019 Agenda  
Twentieth Biennial Meeting of the  
Committee of Age Reading  
Experts**

Working Group of the Canada – US Groundfish Committee TSC  
AFSC Sand Point Facility, NOAA Western Regional Center  
**7600 Sand Point Way, NE, Seattle, WA,  
USA Bldg. #4, Jim Traynor Conference  
Room 2076 April 9 – 11, 2019**

**Tuesday, April 9, 2019**

**I. Call to Order** [8:30 am] – CARE Chair (Kevin McNeel)

**II. Host Statement**

1. Welcome statements & host info: safety/security orientation, refreshments, social. etc.  
(Tom Helser-Age & Growth Program Director)

**III. Introductions**

1. Round-table intro (name, agency, location)
2. Attendance-address, phone, email (written list distributed)

**IV. Approval of 2019 Agenda**

**V. Working Group Reports** [9:00 – 9:45] Activity since CARE 2015 (~ 5 min each)

1. TSC Meeting 2018 (Kevin McNeel)
2. Age Structure exchanges (Kevin McNeel)
3. Website (Jon Short)
4. CARE Forum (Nikki Atkins)
5. CARE Manual (TBD)
6. Charter Committee (TBD)

**VI. CARE & TSC Recommendations** [9:45 – 10:15]

3. CARE to CARE 2017 (see pages 23 & 24 in 2017 CARE Meeting Minutes)
4. CARE to TSC 2017 (see page 25 in 2017 CARE Meeting Minutes)
5. TSC to CARE 2017/2018 (see pages 533 and 23 in 2018 TSC Meeting Minutes)

*Break 10:15 – 10:30*

**VII. Agency Reports** [10:30 – 12:00] Activity since CARE 2017 (~ 5 min each)

1. CDFO – (Steve Wischniowski)
2. IPHC – (Joan Forsberg)

3. AFSC – (Tom Helser)
4. ADF&G – (Kevin McNeel)
5. NWFSC – (Patrick McDonald)
6. WDFW – (Andrew Claiborne)
7. ODFW – (Lisa Kautzi)
8. Additional Attending Agencies

*Lunch 12:00 – 1:15*

**VIII. Topics for Discussion/New Business [1:15 – 2:00]**

1. Symposia/Conferences since CARE 2017 meeting & upcoming
2. Agency updates & verification of sp. info on CARE website
3. Non-agenda items

**IX. Scientific PowerPoint Presentations [2:00 – 2:30]**

1. Andrew Claiborne, *Results of the yelloweye rockfish exchanges: comparison of age determinations from Alaska, British Columbia, and the coasts of Washington and Oregon* (15 min)
2. Chris Hinds, *Importance of juvenile sablefish growth and methods of estimation* (15 min)

*Break 2:30 – 2:45*

**X. Workshops, working groups, hands-on microscope work [2:45 – 5:30]**

1. Yelloweye Working Group [2:45 – 5:30]
2. Working Groups (Traynor Room and Room 2079)
3. Hands-on microscope work and calibration (Traynor Room)

**Wednesday, April 10, 2019**

**XI. Workshops, working groups, hands-on microscope work [8:30 – 12:00]**

1. Sablefish Working Group [10:30 – 12:00]
2. Working Groups (Traynor Room and Room 2079 available all day)
3. Hands-on microscope work and calibration (Traynor Room)  
--- Posters available for viewing during breaks from other tasks all day---

*Lunch 12:00 – 1:15*

**XII. Recommendations [2:00 – 2:30]**

3. 2019 CARE to CARE
4. 2019 CARE to TSC

**XIII. CARE Administrative Business [2:30 – 3:30]**

1. Officer nominations
2. Schedule and location of 2019 meeting

**XIV. Workshops, working groups, hands-on microscope work [3:30 – 5:30]**

1. Working Groups (Traynor Room and Room 2079 available all day)
2. Hands-on microscope work and calibration (Traynor Room)  
--- Posters available for viewing during breaks from other tasks all day---

**XV. CARE Business Meeting Adjourns [4:30]**

**Thursday, April 11, 2019**

**XVI. Working groups & Hands-on Workshop Continuation [8:30 – 12:00]**

1. Workshop- Rapid Estimation of Fish Age Using Fourier Transform-near Infrared Spectroscopy (see attached schedule)
2. Working Groups – additional time available to meet and schedule tasks for 2019
3. Hands-on Workshop – dual microscopes available for calibration work until noon
4. Workshops – additional time if needed

***CARE Social at the Elliot Bay Public House & Brewery -see sign-up sheet and directions (5:30-9:00)***

## APPENDIX-II



NOAA Fisheries, Alaska Fisheries Science Center, Western Regional Center, Building 4, Traynor Room 2076, 7600 Sand Point Way, NE, Seattle WA 981093, April 11<sup>th</sup> & 12<sup>th</sup>, 2019

### Thursday, April 11, 2019

- 9:00 Welcome, introductions and workshop purpose (T. Helser – FT-NIR SIDT Chair)
- 9:30 *Introduction to NIR and FT-technology.* Jason Erickson, Applications Scientist, Bruker Optics.
- 10:00 *Data preprocessing for quantitative and qualitative models based on NIR spectroscopy.* Barry Wise, President, Eigenvector Research, Inc.
- 10:30 *Applications of near infrared spectroscopy to questions in animal physiology.* Carrie Vance, Professor, Mississippi State University.
- 11:00 coffee Break
- 11:20 *Near infrared reflectance spectroscopy detection of male northern dusky salamanders (*Desmognathus fuscus*) response to female pheromones.* Mariana Santos-Rivera, Mississippi State University.
- 11:40 *Predicting fish age at the speed of light.* Brett Wedding, Principle Scientist, Agri-Science Queensland Government, Australia.
- 12:00 Morning discussion and wrap up
- 12:30 Lunch and tour of the AFSC Spectroscopy Laboratory
- 14:00 *Age prediction of Gulf of Mexico red snapper using near infrared spectroscopy.* Beverly Barnett, Fishery Biologist, Southeast Fisheries Science Center, Panama City Laboratory.
- 14:20 *Using FT-NIR to predict daily ages in juvenile red snapper.* Michelle Passerotti, Ph.D. Candidate, University of South Carolina.
- 14:40 *Case study of FT-NIR spectroscopy for Bering Sea Pacific cod stocks.* Jordan Healy, M.S. Candidate, University of Washington.
- 15:00 *Application of near FT-NIR spectroscopy for Gulf of Alaska longnose skate vertebrae.* Morgan Arrington, M.S. Candidate, University of Washington.
- 15:20 *Anadromous chinook salmon otoliths ageing using near infrared spectroscopy.* Andrew Claiborne, Fishery Biologist, Washington Department of Fish and Game.
- 15:40 Coffee Break
- 16:00 *FT-NIR spectroscopy ageing of Bering Sea walleye pollock: Wavelengths to population parameters.* Irina Benson, Research Fishery Biologist, Alaska Fisheries Science Center, Age and Growth Laboratory.
- 16:20 Discussion and session wrap up.

Workshop Social: TBD

### Friday, April 12, 2019

- 9:00 *Precision and accuracy metrics for ageing QA/QC: what is behind the numbers.* Richard McBride, Branch Chief, Population Biology, Northeast Fisheries Science Center, Woods Hole Laboratory.
- 9:30 *Ageing outputs in stock assessments in Queensland-focus on fisheries concerns moving the technology forward.* Julie Robins, Research Scientist, Department of Fisheries and Agriculture, Queensland, Australia.
- 10:00 *A new paradigm of FT-NIR age estimation and challenges in U.S. stock assessments.* TBD, Stock Assessment Scientist, Resource Ecology and Ecosystem Modeling, Alaska Fisheries Science Center.
- 10:30 *Operationalizing FT-NIR ageing enterprise in NOAA Fisheries: A conceptual pathway forward.* Thomas Helser, Supervisory Research Fishery Biologist, Alaska Fisheries Science Center, Age and Growth Laboratory.
- 11:00 *Report of the week's FT-NIRS multispecies analysis by the Strategic Initiative Development Team.* Discussion facilitated by T.E. Helser.
- 12:30 Lunch
- 14:00 Discussion of detailed strategic initiative work plan and report to NOAA Fisheries Science Board.
- 1) Group discussion – likelihood of success for implementing FT-NIRS ageing of fish from otoliths
  - 2) Impediments to success - Prioritization and execution of central scientific questions to be answered
  - 3) Unique requirements of NIR technology in fisheries science and its scalability
  - 4) Implementation time lines for strategic initiative work plan

**APPENDIX-III**



**CARE Meeting 2019**

**April 9-11, 2019**

NOAA, Western Regional  
Center, Alaska Fisheries Science  
Center, Sand Point, Seattle, WA

**CALL FOR PRESENTATIONS & POSTERS**

The Committee of Age Reading Experts is pleased to announce the Call for Presentations and Posters for the 2019 CARE Meeting.

While no specific theme has been designated, topic sessions can focus on current research and the 2018 TSC recommendations: yelloweye rockfish, differentiating cryptic species, and evaluating machine reading of otoliths.

Please submit abstracts by Friday, March 8, 2019 to Kevin McNeel, CARE Chair:

[kevin.mcneel@alaska.gov](mailto:kevin.mcneel@alaska.gov)

Submit abstract as a Word document (preferably) and include the following information:

- Type of presentation (oral or poster)
- Title
- First and Last Name of Author(s)
  - Include any preferred appellation (e.g. Dr. or Ph.D.)
  - Name of Presenter (if more than one author)
  - Include any affiliations (spell out agency), city, country, and e-mail
- Text of abstract in 250 words or less
- Amount of time needed for presentation (maximum of 20 minutes-including questions)

The CARE meeting includes presentations, age reader calibration, workshops and workgroup meetings, held April 9-11, 2019. Presentation titles and abstracts will be published online in CARE the minutes.

- Oral presentations-Tuesday (afternoon), April 9th
- Poster presentation- will be displayed throughout the meeting

CARE Website: <http://care.psmfc.org>

## **APPENDIX-IV**



### **Nineteenth Biennial Meeting of the Committee of Age Reading Experts**

**Working Group of the Canada – US Groundfish Committee TSC**

**AFSC Sand Point Facility, NOAA Western Regional Center**

**April 4 – 6, 2017**

### **Abstracts**

**Type of Presentation:** Oral

**Title:** Results of the yelloweye rockfish exchanges: comparison of age determinations from Alaska, British Columbia, and the coasts of Washington and Oregon

**Authors and affiliation:**

Andrew Claiborne<sup>1</sup>

<sup>1</sup>Washington Department of Fish and Wildlife, 1111 Washington St SE Olympia WA, 98501

**Abstract:**

Yelloweye rockfish are an ecologically and commercially important species from Alaska to central California and one of the longer-living rockfish with a reported maximum age of 147. Several agencies and members of the Committee of Age Reading Experts (CARE) produce age estimates for yelloweye rockfish across their range, yet few CARE sample exchanges have occurred in the last two decades. Here we compare age estimates independently made between 5 laboratories with samples originating from Alaska to California. Overall, age estimates agreed between readers for yellow eye up to age-30. However, bias between labs was clear for ages ranging from 40 to 120. CARE exchange results are discussed in the context of the 2017 stock assessment of yellow eye in the federal and state waters of Washington, Oregon, and California, and recommendations to further validate ages of yelloweye rockfish.

**Type of Presentation:** Oral

**Title:** The importance of juvenile sablefish growth and methods of estimation

**Authors and affiliation:**

Wess Strasburger<sup>1</sup>, Chris Hinds<sup>2</sup>

<sup>1</sup> Auke Bay Laboratories, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration, United States Department of Commerce, 17109 Point Lena Loop Road, Juneau, AK 99801

<sup>2</sup>Alaska Department of Fish & Game, Division of Commercial Fisheries, Mark, Tag and Age Laboratory, Juneau, AK 99811

**Abstract:**

Gulf of Alaska sablefish biomass has declined since 1988 with only a few strong year classes supporting the fishery. Studies suggest that juvenile sablefish growth may be a better indicator of recruitment than spawning stock biomass, but that has not been studied in Alaska. To compare juvenile growth with recruitment and environmental factors, we developed three objectives: (1) compare daily increment counts between the lapillus

and sagitta otoliths to ensure that results using either otolith are comparable; (2) compare objective fish and otolith measurements to highlight growth differences across conditions; and (3) model growth rates across environmental and ecological conditions using daily increment widths and relate that to recruitment events. To compare lapillus and sagitta otoliths, samples from the 2014, 2016, 2017 National Marine Fisheries Surface Trawl were mounted to petrographic slides and polished using sand paper and lapping film to image daily growth bands. Using image analysis software, we found no difference between lapillus and sagitta daily growth counts ( $-0.75 + 7.2$  SD differences between structures) and estimated an average hatch date of April 12th. Our preliminary analysis supports that there is no difference between daily counts for each structure and we will focus on the lapillus for the remainder of the study. To preliminarily compare objective otolith measurements, we took images of unpolished otoliths from the trawl samples and measured lapillus and sagitta otolith length and height using image analysis. We found a positive relationship between lapillus and sagitta otolith diameters and fish length and will further investigate this relationship across controlled environmental factors (temperature and food ration) to look for objective differences in otolith growth using fish that were reared at Auke Bay Laboratories. To model growth rates, juvenile sablefish otoliths from 1997-2018 Middleton Island rhinoceros auklet bill loads will be processed to estimate juvenile growth spanning over 20 years and juveniles reared at Auke Bay Laboratories in a controlled temperature and feeding study will be used to interpret and validate results. Given preliminary results from objectives 1 and 2, we will focus on processing lapillus from bill load samples and will continue to collect daily increment counts, otolith length and height measurements, and otolith increment widths to improve evaluation of objectives 2 and 3.

## APPENDIX-V

### **Rougheye/Blackspotted/Shortraker Rockfish Working Group Report 2019**

Notes from 2017 CARE meeting: Several agencies are dealing with this 'mixed bag' problem. Three in particular (AFSC, ADF&G and CDFO) are aware of the potential, and others (NWFSC, WDFW) may have the problem but are currently unaware of any specific problems with species identification in their collections as they are just starting to calibrate on this species group. We have some tools to develop (Kevin's R-based approach of otolith shape discrimination and Harris/Hutchinson rougheye-blackspotted shape morphometric project) that may help with this problem. It was suggested that a working group could potentially address this question from a more formal perspective and perhaps gain funding/prioritization via TSC. We need to prioritize collection and analysis of more vouchered shortraker via DNA analysis. RE/BS/SR RF Working Group = Charles Hutchinson (lead), Betty Goetz, Irina Benson, Tom Helser. Other agencies: Kevin McNeel, Elisa Russ, Joanne Groot, Stephen Wischniowski

#### **AGENCY PROJECT STATUS REPORTS 2019**

**AFSC** – Two projects are currently addressing this situation with Alaskan samples.

Problem Blackspotted/rougheye/shortraker mixed observer sample (Betty Goetz) - An observer collection of rougheye rockfish was submitted for ageing (B30713A) (n = 307) and initial testing suggested a potential problem with mixing. Some otoliths appear to have characteristics which suggested that they might be shortraker rockfish. We also knew that rougheye samples were typically mixes of blackspotted and rougheye rockfish. Although we already have a research plan to separate blackspotted rockfish from rougheye rockfish, this identification protocol requires ages and we do not yet have reliable ageing criteria for shortraker rockfish. The model developed would not assist in the separation of a third species. To address this problem, we have done the following:

- (1) ImagePro morphometrics and otolith weights have been taken from all otoliths in the problem cruise.
- (2) ImagePro morphometrics and otolith weights have been taken from DNA vouchered blackspotted and rougheye rockfish used in the Blackspotted/rougheye rockfish separation model.
- (3) A selection of smaller shortraker rockfish collected from surveys (not observer samples) have been accessed and are ready for morphometric measurement/otolith weight.

Blackspotted/Rougheye Rockfish otolith separation model (Charles Hutchinson) -

**ADF&G** – The Alaska Department of Fish & Game has a consistent collection of shortraker and mixed rougheye and blackspotted otoliths from Prince William Sound, Alaska. Historically, the Alaska Department of Fish & Game Age Determination Unit (ADU) submitted species corrections to regional samplers based on otolith morphology and growth patterns. The ADU was seeking to automate this procedure and look for significance of species corrections using a small sample size of genetically verified species. The genetic results found a significant proportion of the rougheye rockfish were blackspotted rockfish and an automated shape analysis using R could significantly identify specimens within the genetic collection. However, use of the model for otoliths outside of the genetically verified specimens did not work, because of the small sample size. The ADU is seeking to continue this work and to verify results using results from the AFSC models and future work by CDFO to improve the current shape identification or species correction procedures done at the ADU.

**CDFO** – Looking at cost cutting measures to reduce DNA charges to groundfish for the identification of the Blackspotted/Rougheye Rockfish complex. 704 Blackspotted/Rougheye otoliths were collected from all groundfish surveys in 2018, all structures were genetically identified by the Molecular Genetics Lab at PBS. All structures were aged, imaged and weighed. A small subsample (~70) was tested during the 2019 CARE workshop in Seattle, WA. Both techniques were employed, Kevin's R-based approach of otolith shape discrimination and Harris/Hutchinson rougheye-blackspotted shape morphometric project.

Unfortunately, time constraints worked against us and we were unable to determine the errors that were generated in the Harris/Hutchinson approach using ImagePro software. However, the R-based approach provided results that indicate that otolith shape is a viable means of determining species within this complex for fish caught of West Coast Vancouver Island.

The SCL is looking at the incorporation of both otolith weight and shape imagery during the age estimation process for all its species. This as a means increase the QA/QC before submitting age estimates to its clients.