

**SSC Groundfish Subcommittee Report on
Groundfish Stock Assessment Process Review Workshop
Webinar Held on 01 December 2017**

The SSC Groundfish Subcommittee met via Webinar on 1st December 2017 to review the 2017 groundfish stock assessment and Stock Assessment Review (STAR) Panel process and recommend process improvements for future groundfish stock assessments and STAR Panel meetings. The draft agenda is attached as Appendix A; a list of participants is attached as Appendix B.

CIE perspective and recommendations for improvement

Dr. Panayiota Apostolaki, the reviewer from the Center for Independent Experts (CIE) who was a member of all three STAR Panels, provided the following comments and suggestions.

Data:

- Delays in providing data this year created difficulties for the Stock Assessment Teams (STATs). There would be greater benefits if the STATs had more time to review and discuss data with the data providers. It is strongly recommended that the STATs take time to better understand the data being provided, rather than just taking the data and running with them.
- Collaboration between agencies seems to be a very important aspect as stocks cross state / international borders. Collaboration should be increased, particularly internationally (Canada and Mexico).

Data processing:

- Greater attention should be given to compositional data and the sampling and data processing used to develop the length- and age-compositions given the high influence of these data in many of the assessments.

Assessment process:

- No specific comments.

Review process, pre-review:

- Providing background materials ahead of time is very helpful to get the reviewers up to speed.
- Issue of surveys – It is hard to fully understand all the details (the spatio-temporal scope) and how survey interacts with different species being assessed. It would be helpful to have an overview document about the different surveys in background material that gives a good description of each survey including its geographic and temporal coverage. This

- will help reviewers understand the ‘value’ of the survey as it pertains to the species being assessed.
- It was difficult to review draft assessment documents but then find at the start of the STAR meeting that the STATs had continued to work on their models during the two-week interim and the assessment model and results had changed. This makes the review process less efficient. If STATs modify their models during the interval after submitting their pre-STAR draft assessment, then reviewers should receive the updated documents and be notified of the situation so that reviewers can plan and prepare adequately to understand the new material.

Review process, review meeting:

- There were impressive amounts of work by STAT teams during the review week to accommodate requests, but we should all appreciate that time-crunched analyses are more prone to errors. We should be concerned that too much analysis was being done during the review week that should have been completed prior to the review.
- It is very difficult to fully understand data when the assessment models are being ‘quickly’ run during the STAR process. It is too easy to miss important details.
- For the procedure of Panel requests and comments and STAT responses, it would be helpful to have a pre-structured template and process for communicating the STAT responses to the STAR panel’s requests during the review week as this will help the CIE reviewers and STAR Panel chairs document the review activities more completely. This was a particularly important recommendation for Dr. Apostolaki! (*Note: The CIE reviewer who sits on all the STAR Panels has very limited time to prepare their report for the CIE.*)

Review process, across STAR panels:

- There was good consistency across STAR Panels, but it was surprising how much work was done after the pre-STAR documents had been sent out to reviewers.
- It was very useful for Dr. Apostolaki to sit on all the STAR Panels because her knowledge about how our system operates increased with each STAR panel.

Review process, post STAR panel:

- The STATs responded to follow-up CIE requests, which was very impressive.

Other:

- No specific comments.

SSC perspectives and recommendations for improvement

Data:

- David Sampson, SSC and Chair for the Pacific ocean perch and lingcod STAR. During the STAR meeting the panel uncovered some data issues resulting in the exclusion of fishery age-composition data. It is important that data be closely scrutinized and fully vetted prior to the STAR meeting.

- John Field, SSC and Chair for yellowtail rockfish and yelloweye rockfish STAR. There should be better documentation of key data sources for the CIE reviewers. These documents could be a common set of documentation referred to by all the assessments. Having such common documentation would also reduce the burden on the STATS. There could be one basic document for each of the key data sources.
 - Theresa Tsou (SSC and lingcod STAT) informed the group that documents have been developed for many of the WA data sources. These documents could be referred to by future assessments and they may be a useful guide for documenting other data sources.
- Martin Dorn, SSC and Chair for the blue/deacon rockfish and scorpionfish STAR. Assessments for nearshore species can have multiple fishery-dependent indices and often they are compiled in different ways. Consequently, the amount of documentation can be overwhelming for STAR panelists.

Data processing:

- John Budrick, SSC. Pre-assessment workshops should be used to resolve methodological questions regarding new methods and their application. The goal is to prevent STAR Panels getting sidetracked in discussions of unfamiliar methods, as occurred to some extent in 2017 due to unfamiliarity with the VAST software and diagnostics.

Assessment process:

- John Field. We should have separate STATS for different stock assessment areas when individual assessments (having no connectivity) are done.
- John Field. We need a more consistent way to come up with the maximum age that is used with the Hamel prior for natural mortality. This could take the form of more complete guidance on a default accepted practice.
- John Field. There needs to be better documentation of new maturity curves where older data are thrown out in favor of recent data to explain why older curves are no longer adequate (e.g., skipped spawning, atresia, et cetera). Although a sensitivity analysis was provided that showed that the maturity curve had little influence, there should be a process and better defense for throwing out older data.
- John Field. Diagnostics for CPUE time series: some quantile-quantile (QQ) catch-per-unit-effort time series were really nasty, at which point do we throw out model based indices; [POP/Lingcod] also some diagnostic questions regarding VAST.
- John Budrick. Increased standardization of assessment outputs would facilitate the communication of assessment results.

Review process, general:

- David Sampson. The CIE reviewers seemed to be confused about how we handle steepness in our groundfish assessment process. The new Thorson et al. paper (in press) discusses how the Council deals with steepness. This paper could be a good guide for how to document other aspects of our assessments, such as documenting the surveys, as suggested by Dr. Apostolaki.

- Martin Dorn. Documentation that accompanies STAT responses to STAR requests is a good idea but should be as minimal as possible (e.g., several written bullet points)
- Will Satterthwaite, SSC Chair. It seemed that a lot of time was spent this cycle on details that did not bear on the ultimate acceptance / rejection of the assessments. Time lost to resolving minor technical details and revising decision tables for very minor adjustments in assumed removals limited the amount of time available for more substantive decisions, such as best available science and category designation. The Terms of Reference should call for clear specification of removal assumptions early in the process and possibly set a minimum threshold for worthwhile changes from standard or previously used assumptions.
- Will Satterthwaite. If STAR Panel members have concerns about the assessment document, they should contact the STAT in advance of the STAR meeting to streamline and focus discussion during the main meeting. This will make the review process more efficient by ensuring that review time is spent on potentially significant technical concerns, rather than clarifying what was done but poorly documented.
- Martin Dorn. The panel and STAT were stressed for time during the review meeting because essentially three standalone assessments were being reviewed.
 - It was noted that all three STAR panels evaluated three separate assessments, whereas the Terms of Reference state that there should only be two assessments reviewed per STAR Panel. This point should be revisited during the revision of the Terms of Reference. It is difficult to determine how many separate assessment models (spatial areas) will be needed in advance of actually conducting an assessment.
- John Budrick. STAT teams formed of staff from both Science Centers and joint meetings of stock assessors from both Science Centers would facilitate communication and improve consistency in modeling approaches.
- John Budrick. Coordination of ageing labs to facilitate ageing and cross-validation studies would be beneficial, but it is noted that this could reduce capacity for production age-reading. Any additional loss of age-reading capacity would likely adversely affect future assessments.

Review process, post STAR panel:

- John Budrick. A representative from each STAT should be available to respond to questions during the SSC Groundfish Subcommittee discussion of the assessments.
- Various SSC members. The situation that developed this year with the Pacific ocean perch assessment illustrates that the Terms of Reference need to be clearer regarding what changes can be made during the steps of the process following the STAR panel meeting and culminating in final SSC review (i.e., during Groundfish Subcommittee meetings and/or the mop-up STAR Panel). Can the SSC request a STAT to conduct additional model runs for an assessment that was approved by a STAR Panel or is the SSC's decision limited to approving or rejecting a STAR-approved assessment? (*Note: If an assessment is rejected the Council uses the most recently approved assessment*).

Other:

- No specific comments.

STAT perspectives and recommendations for improvement

Data:

- Have a list of the potential sources of data (and all of their denominations, nicknames, etc.) that is easily accessible by all. It should include contact information for acquiring the data and/or information regarding the data.
 - There should be documentation available for each data source that STATs can incorporate by reference in their stock assessment documents. The sets of data documentation should be made available to reviewers and the public by means of ftp sites as part of the STAR process.
- Commercial fishery data: In the absence of extenuating circumstances, PacFIN should be the single source for extractions of commercial fishery data (1980-present).
 - There should be more complete documentation of the data housed in PacFIN.
 - The States (& SWFSC) and PacFIN should work to include total counts of ageing structures to the PacFIN Biological Data System (BDS), along with the numbers of fish that have been aged.
 - From Theresa Tsou. PacFIN standard reports should include a report by agency that summarizes the available biological data, including the number of unaged structures.
 - OR and WA should continue to send post-1980 data to PacFIN, including more recent apportionments of multi-species market categories.
 - There needs to be clarity that PacFIN has not fully hosted pre-1980 catch and biological data. We should work towards the goal of PacFIN being the main repository for commercial fishery data.
 - OR and WA and PacFIN should work to make pre-1981 landings estimates available within PacFIN.
 - Note: not all the available historical biological sample data are available in PacFIN. For example, ODFW has biological data back to the 1960s that have probably not been uploaded to PacFIN.
 - For CA commercial fishery data all CalCOM data and algorithms for transforming fishticket information should be integrated into PacFIN. This will be an involved process since there are abundant data and algorithms.
 - The SWFSC supports this goal and agrees there needs to be a careful transition. The transition will take up resources not fully available at the SWFSC.
 - It is important to have a CalCOM-to-PacFIN data flow plan in place before the 2019 assessment cycle. There is widespread support to get all state commercial fishery data uploaded to PacFIN.
- Recreational fishery data. There is widespread support to get all state recreational fishery data uploaded to RecFIN. There is an ongoing effort to improve data flow and acquisition in RecFIN.
 - Historical WA recreational data (from the Marine Recreational Fisheries Statistics Survey, MRFSS) are incorrect and work is needed to reconcile those errors (the

original data need to be uploaded to RecFIN – WA Ocean Survey Program (OSP) estimates and MRFSS estimates are conflated in the RecFIN database).

- Historical catch reconstructions. Recent historical catch reconstructions have been handled by the individual states. One main objective of the historical catch reconstruction process was to have these historical catch data sets fully vetted by data stewards, STATs, and the SSC before they are widely used (i.e., so there are no *ad hoc* catch reconstructions by each STAT).
 - There is a new Bayesian methodology proposed by the SWFSC for determining species compositions that might be applied to historical market categories (rather than ad hoc approaches). A methodology review of this new approach is being planned for spring 2018.
 - There may need to be an interim solution based on data borrowing rules. Although the data-borrowing approach could be reviewed during the spring methodology review, there is concern about overloading the agenda of the spring methodology review. Having a separate workshop on the historical catch reconstruction of skates may be a better place to review borrowing rules.
- Data submission deadlines. There needs to be better adherence to data submission deadlines. Should there be an “enforcer” who is tasked with strongly encouraging providers to get the data in early, while also keeping track of all of the data that should be coming in and monitoring their status?
 - Deadlines have been set in the past based on the time needed by assessment authors to work with the data. There needs to be better communication between STATs and data stewards.
 - Too often, the original delivery is followed by a lengthy period of exchanges between the STATs and data providers as errors are discovered and corrected after the modeling process begins. This is a serious problem because making data corrections late in the modeling process sometimes requires a reset by the STAT (e.g., recalculation of biomass indices using general linear mixed models) and represents a significant loss of momentum.
 - **Recommendation:** Develop a formal process for vetting data in advance of conducting the assessment, perhaps using pre-assessment workshops. One idea is to have a single person working up a dataset for all STATs to use (e.g., Melissa Monk’s work-up of fishery catch-per-unit-effort data). However, this could be very burdensome if the designated person is also leading a STAT.
 - If “one-stop data shopping” is not available through PacFIN and RecFIN, future assessment deadlines should anticipate that greater time will be needed for post-delivery quality-assurance / quality-control of data sets.
- Identify database fields that include a mix of units (flagged by an indicator in another field). An example is fish length measured as fork-length in some years and as total length in others. Determine if a field with consistent units should be developed, in order to avoid confusion/mistakes. Also, it is important to consistently display units in assessment tables and figures.

- Trawl survey data. There seems to be variation between STATs in how they use trawl survey data (indices and compositions). This is potentially confusing to reviewers and stake-holders.
- The NWFSC, SWFSC, and others could develop appendices that summarize commonly used surveys and the history of gear use (particularly trawl), fishing practices, and major regulatory restrictions affecting gear usage. This would: improve consistency in terminology and descriptions; lessen the potential for confusion by reviewers and stakeholder; while reducing STAT time for (re-)writing descriptive text with each assessment. These appendices could be reviewed by the SSC before use.
- The NWFSC will consider creating a series of maps that show spatial distribution of the various indices of abundance with some indication of the depth and temporal coverage. This could be a digital map with multiple overlays.

Data Processing:

- Standardized code and user manuals for processing data (and a clear understanding by STATs) are needed to facilitate and speed up the development of assessments. This includes general documentation of the Vector Autoregressive Spatial Temporal (VAST) software package and how it can be applied to standard databases (e.g., the NWFSC bottom trawl survey).
 - Consider developing an R-Markdown script as a tool for producing standardized documentation of how VAST was applied in each particular assessment.
 - Currently, there are separate code packages to work-up different survey data (written by Allan Hicks) with little documentation on how to use each code package. These code packages need to be merged and improved documentation developed.
- Accepted practices are needed for how to compile compositional data and model conditional age-at-length. Also needed are associated standardized code and user manuals for producing compositional data for use with Stock Synthesis.
- All data processing needs should be enumerated, addressed, and the associated steps documented.
- As fishery data processing code matures, consider having PSMFC host the data processing software.

Assessment Process:

- A user guide for a conducting a “basic” assessment would be helpful. It should include identifying NWFSC and other available software packages and the data sets with which they are associated, other commonly-used data sets, and the meaning of common coding conventions (e.g., whether “Sex” = 1 indicate a female or a male).
- Develop estimates of the time needed for each stage/part of the assessment process, for:
 - planning;
 - triage when falling behind; and
 - prioritizing work to improve speed/efficiency of tasks.
- There is good potential for data processing improvements to facilitate the development of assessments. Examples include the use of R-markdown scripts to produce standard

tables; development of automated methods to update McAllister-Ianelli weighting; and more wide-spread use of the Dirichlet multinomial method for automatic data weighting.

- Need to identify a standard and reliable review process for assessment documents produced using R-Markdown. The review process should include a spell checker function and it should not rely on embedding comments in PDFs.
- Clearer guidance from the SSC is needed in the next version of the Accepted Practices document on the following issues.
 - Whether and how a STAT should include the triennial survey (split or not) and other data sources in an assessment.
 - What a STAT should do if it wants to make a large change to the data in an assessment (e.g., dropping an index that was used in the previous assessment).
 - What a STAT should do when confronted with conflicting surveys in an assessment.
 - The Center for the Advancement of Population Assessment Methodology (CAPAM) workshop on data weighting provided some guidance. The overall view was not to drop data but rather to appropriately weight it.
 - Guidance is needed on what constitutes appropriate weighting when there are conflicting surveys.
 - Consider whether autocorrelation in recruitment deviations should be included as a standard sensitivity run.
 - Also, consider the potential for interaction between estimated / apparent autocorrelation in recruitment deviations and ageing error assumptions / estimations. Apparent autocorrelation in recruitment can be at least partially due to ageing error that is not properly accounted for. Conversely, assuming more ageing error than is actually occurring can mask recruitment autocorrelation.

Review Process:

- STAR panel chairs should run the STAR meeting to ensure the following.
 - Time should not be wasted discussing issues: (1) that have already been decided through SSC review, as identified in the Terms of Reference and Accepted Practices Guidelines; (2) that are not strongly affecting assessment results; or (3) for which the STAT or reviewers have provided strong evidence to challenge SSC accepted methods.
 - The review should comply with the Terms of Reference and stay on schedule.
 - The goal is ensure that adequate time is available to consider important issues (e.g., development of the decision table).
 - The Terms of Reference and Accepted Practices Guidelines should provide clearer direction to STAR Panel Chairs on how to the conduct STAR meetings.
- When an assessment is reviewed and accepted by a STAR Panel, the Panel Chair should support and defend the STAR Panel decisions and the assessment document when it is subsequently reviewed by the SSC. The STAT is also responsible for defending the assessment and should attend the SSC meeting where the final review step occurs. Earlier communication between the SSC and STAT is recommended to avoid an extended SSC review, as was done this year for POP. This issue needs to be flagged so

the SSC and Council will carefully consider improvements to the process and incorporate them in the Terms of Reference.

- Greater clarity is needed regarding the use of survey catchability estimates as diagnostic measures. For example, is $Survey_Q = 10\%$ (or 200%) a red flag? If so, what further steps should be taken?
- Clarification of the SSC role after an assessment passes STAR Panel review.
 - More clearly delineate whether the SSC can only provide “a final review” (approve / reject) or can conduct “a repeated technical review”, as occurred in 2017 with the Pacific ocean perch assessment.
- Provide greater clarity on what Methodology Reviews are intended to accomplish. For example, methods previously reviewed during Methods Reviews and included as “acceptable practices” in the SSC’s “Accepted Practices Guidelines for Groundfish Stock Assessments”, were revisited and discussed during STAR panels.

Other:

- Assessment outputs:
 - Develop R code to produce standardized tables and figures for presentations at Council meetings.
 - Include both years of the current biennium in forecasts and decision tables, so that there is no gap between the estimated and forecasted years shown.
 - Do not report model-forecasted OFLs and ABCs for the years in the current biennium that already have harvest specifications.
- Improve communication between the NWFSC and SWFSC assessment teams
 - Periodic joint team meetings.
 - Develop lists of instructions on how to do various routine tasks.
 - Continue joint SWFSC / NWFSC STATs. Collaboration is good!
- Improve coordination between age-reading labs. Include this as a priority in the Council’s new 5-year Research and Data Needs document. Specifically, we need to improve the capacity to do more age-reading.

Advisors’ perspectives and recommendations for improvement

- Continued early communication by the advisors with the STATs regarding the ACL attainment and other aspects affecting upcoming specification would be beneficial. Such communication should minimize the number of iterations the STATs need to run and the resulting workload.
- The Advisors from the GAP and GMT provided critical input during STAR Panel meetings and the STAR Panel reviewers expressed support for their continued participation.
- There should be improved vetting of assessment data during the pre-assessment workshops, rather than the STATs just providing overviews of their plans. This could require earlier availability of the data or setting the workshops later in the process to provide time for the STATs to screen the data and bring preliminary analyses forward for review.

- Better documentation of the common data sources used in groundfish assessments is needed to provide background for reviewers. Such documentation could reduce workload for the STATs and eliminate redundancy in the documentation across assessments. It would also allow the STAT to focus on analytical duties rather than having to repetitiously document the surveys and other common data sources.

Recommended improvements for the stock assessment process and reviews

- STATs should prepare detailed lists of any changes to the assessment from the pre-STAR draft originally distributed (e.g., an errata sheet). To the extent possible, there should not be extensive changes to an assessment after the pre-STAR draft is distributed.
- STATs should prepare a formal response to STAR requests with a written explanation of how the new analysis affected model results. It is helpful when STATs provide extractable figures and/or tables with their responses to STAR requests.
- The Terms of Reference should be clear on the process and level of documentation needed when an assessment is rejected by the STAR panel or withdrawn by the STAT and not recommended for mop-up. For example, in the case of yellowtail rockfish south, the STAT withdrew the assessment and it was not clear what documentation the STAT needed to provide in the assessment document.
- There should be better stand-alone documentation of key data sources.
- There should be guidance on selecting the maximum age for use with an M prior.
- Formally establish an August Groundfish Subcommittee meeting for pre-approval of assessments before they are reviewed by the full SSC.
- Carefully review the Accepted Practices guidelines for practices that may be irrelevant. For example, should STATs be required to provide a sensitivity run that used Dirichlet multinomial data weighting, which was requested in the current guidelines but ignored by most STATs?
- Emphasize the need for pre-assessment workshops to evaluate the data. Assessment planning should carefully evaluate the timing of data workshops. There should be guidance on the types of data displays and analyses that would aid in efficiently evaluating assessment data in advance of a STAR panel. This is connected to a thorough quality assurance and quality control of data archived in PacFIN and RecFIN.
- The revised Terms of Reference (or the Accepted Practices Guidelines) should clarify all of the following:
 - Whether the STAR or the SSC is responsible for recommending whether the next assessment should be a full assessment or could be an update.
 - Whether the major axes of uncertainty can be changed in an update assessment from what was provided in the previous full assessment, and if so, any conditions that apply.
 - Specify rules for setting the fishery removals that a STAT assumes for the projection period of an assessment projection, particularly for the initial two years for which there are approved harvest specifications.
 - Using ACLs may not be representative of recent conditions.

- One option would be to instruct the STAT to confer with the GMT, with GMT recommended values subject to SSC approval.
- Specify how the buffer for scientific uncertainty (sigma) is calculated, either from the decision table states of nature or from the uncertainty in the estimate of ending biomass. The specification should include the equation(s) used for calculating sigma.
- Indicate whether the STAR panel should recommend category designations for the stock under review.
- Include a digital map of the geographic areas covered by the surveys in the general background information provided for STAR panels.
- Include the sensitivity comparison plots devised by Jason Cope as a standard output in the R4SS software package.
- Standardize the number of significant digits that STATs should use when reporting outputs, assuming fixed values from priors, and applying buffers. Usage was inconsistent in 2017 assessments.

References

Thorson, J.T., Dorn, M.W., and Hamel, O.S. (*In press*). Steepness for West Coast rockfishes: Results from a twelve-year experiment in iterative regional meta-analysis. *Canadian Journal of Fisheries and Aquatic Sciences*.

Appendix A.

Proposed Agenda
Pacific Fishery Management Council and the National Marine Fisheries Service
Northwest and Southwest Fisheries Science Centers
Groundfish Stock Assessment Process Review Workshop

Pacific Fishery Management Council
Large Conference Room
7700 N.E. Ambassador Place, Suite 101
Portland, OR 97220
Online Webinar
Telephone: 503-820-2280

December 1, 2017

A workshop sponsored by the Pacific Fishery Management Council and the Northwest and Southwest Fisheries Sciences Centers will be held to review the 2017 groundfish stock assessment process. This workshop will be conducted with remote attendance via webinar (see webinar information below). There will also be a public listening station at the Pacific Council office (address listed above). This workshop is open to the public.

The purpose of the Groundfish Stock Assessment Process Review workshop is to review the 2017 groundfish stock assessment and STAR Panel process and recommend process improvements for future groundfish stock assessments and STAR Panel meetings.

To Attend the GoToWebinar:

1. Use this link: <https://www.gotomeeting.com/webinar>
2. Click "Join a Webinar" in the top right of page.
3. Enter the Webinar ID: 838-141-027
4. Please enter your name and email address (required)
5. You must use your telephone for the audio portion of the meeting by dialing this TOLL number 1 (415) 930-5321
6. Enter the Attendee phone audio access code 248-304-493
7. Enter your audio phone pin (shown on screen after joining the webinar)

System Requirements

- PC-based attendees: Required: Windows® 7, Vista, or XP
- Mac®-based attendees: Required: Mac OS® X 10.5 or newer
- Mobile attendees: Required: iPhone®, iPad®, Android™ phone or Android tablet (See the GoToMeeting Webinar Apps)

Friday, December 1

- 8:30 a.m. Welcome and Introductions Dave Sampson
- 8:45 a.m. Review the Draft Agenda and Discuss Meeting Format
Agree on Time and Method for Accepting Public Comments
- 9 a.m. CIE Perspective on the 2017 Stock Assessment Process and Recommendations
for Improvement Panayiota Apostolaki
- 10 a.m. SSC Perspectives on the 2017 Stock Assessment Process and Recommendations
for Improvement
- 10:45 a.m. Break
- 11 a.m. STAT Perspectives on the 2017 Stock Assessment Process and Recommendations
for Improvement
- 12 p.m. Lunch
- 1 p.m. Advisors' Perspectives on the 2017 Stock Assessment Process and
Recommendations for Improvement Lynn Mattes, Patrick Mirick,
Heather Reed, Dan Waldeck, Louie Zimm, John DeVore
- 2 p.m. Recommended Improvements for the Stock Assessment Process and Reviews
- 3 p.m. Meeting Adjourns

Appendix B. Participant list (*s indicate Groundfish Subcommittee members)

Last Name	First Name
Ames	Rob
Apostolaki	Panayiota
Bellquist	Lyall
Berger *	Aaron
Blackhart	Kristan
Budrick *	John
Buell	Troy
DeVore	John
Dick	EJ
Dorn *	Martin
Edwards	Jason
Field *	John
Freeman	Mark
Furnish	Abigail
Gonzalez	Jonathan
Haltuch	Melissa
Hamel *	Owen
Hastie	Jim
Heath	Christian
Key *	Meisha
Mattes	Lynn
Miller	Stacey
Ryznar	Bob
Sampson *	David
Satterthwaite	Will
Sharma	Rishi
Stephens	Andi
Taylor	Ian
Tsou *	Theresa
Vieser	Jeffrey
Waldeck	Dan
Wallace	John
Wargo	Lorna
Wetzel	Chantel
Weyland	Phil
Whitman	Ali