MICHIGAN STATE UNIVERSITY | Usability/Accessibility Research and Consulting

To: Robert Van Rennes, Big Ten Academic Alliance
From: Grey L. Pierce, MSU Usability/Accessibility Research and Consulting
CC: Heidi Schroeder, MSU Libraries
Subject: ACS Publications High-Level Accessibility Evaluation for the Library Accessibility Alliance
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MSU Usability/Accessibility Research and Consulting (MSU UARC) conducted a high-level accessibility evaluation of the ACS Publications platform to evaluate its conformance with WCAG 2.0 AA Criteria. This evaluation did not include all functionality or content of the site or all WCAG 2.0 AA Success Criteria.

During this evaluation, a number of issues were found that may make the site and its content impossible to use for some individuals with disabilities and difficult to use for most others.

Keyboard users, including screen reader users and users with dexterity impairments, will find it impossible to use a some site content. Some content cannot be reached or operated via keyboard, making it impossible to use for those that rely on keyboard access. Focus order is incorrect in some places, increasing the difficulty of using the site with a keyboard. Most interactive elements lack a sufficiently visible focus indicator, making it difficult for many keyboard-only users to effectively use them, as they cannot determine when they have reached the correct element. Moving focus to some elements also causes page content to unexpectedly change.

Individuals with visual impairments, including those that rely on screen readers, will also have significant problems using the site. Some content is not read out correctly and structural information (including headings and lists) is not appropriately conveyed to users, making it difficult or impossible to understand content and organization in places. Some form inputs are not appropriately labeled, making those inputs difficult or impossible to use for those that rely on screen readers. Custom elements do not correctly announce themselves to screen readers, making them difficult to understand and use. Most images lack appropriate alternative text, significantly impacting users with visual impairments. Images of text are also used in place of styled text, preventing users of a variety of assistive technologies from being able to effectively understand some content.

The PDF has not been tagged for accessibility and no structural information is provided to assistive technologies, making it extremely difficult to use and navigate for users with disabilities. Alternative text is not provided for any images, and no title or language are provided to assistive technologies.

Other issues were found that will make it difficult for users with a variety of disabilities to effectively use the system, including insufficient color contrast, use of color alone to convey information, insufficient link context, no means to bypass repeated navigation, and inappropriate page titles.

To improve access for users with disabilities, MSU UARC recommends a full WCAG 2.0 AA evaluation and that the problems discovered be remediated.

Note: Results for "nucleic acid " were used as an example of a Search Results page, "ACS Chemical Biology" was used as an example of a Journal page, ACS Chemical Biology 2019 Issues was used as an example of a List of Issues page, ACS Chemical Biology Vol. 14, Issue 10 was used as an example of an Issue page, and "Specific Recognition of Promoter G-Quadruplex DNAs by Small Molecule Ligands and Light-up Probes" was used as an example of an Article page and PDF.

For reference, a screenshot of the Home page at the time this evaluation was completed has been included at the end of this memo.

High-Level Findings

Document Structure

- Headings are not appropriately structured throughout the site. [WCAG 2.0 SC 1.3.1]
  - On the Home and Journal pages, "RESEARCHERS", "AUTHORS", etc. should be tagged as h2s, not h4s
  - On the Home page, "ACS Publications" should be tagged as a heading (h1)
  - On the Home page, "Browse Publications", "BEHIND EVERY ARTICLE...", "Trending ACS Articles", "About ACS", and "Partners" should be tagged as headings (h2s)
  - On the Home page, "All Subject Areas" in Browse Publications (Browse by Subject) should be tagged as an h4, not an h6
  - On the Home page, "CONTENT TYPES" and "SUBJECTS" in Browse Publications (List View) should be tagged as h3s, not h6s
  - On the Home page, letter headings in Browse Publications (List View) should be tagged as h3s, not h6s
  - On the Home page, headings within the "ACS Editors' Choice" panel should be tagged as h3s, not h4s
  - On the Home page, "Teri W. Odom's...", "Mireille Kamariza's...", etc. should not be tagged as headings
  - On the Home page, "About", "Resources and Information", "Support & Contact", and "Connect with ACS Publications" should be tagged as h2s, not h4s
  - On the Search Results page, "NARROW RESULTS" should be tagged as an h2, not an h3
  - On the Search Results page, headings within the Narrow Results section (e.g., "FILTERS APPLIED", "CONTENT GROUP TYPE") should be tagged as h4s, not h3s
  - On the Search Results page, article titles should be tagged as h2s, not h5s, and should be grouped under an h1
  - On the Journal page, the "ACS Chemical Biology" graphic should be tagged as a heading (h1)
  - On the Journal page, the "ASAP ARTICLES" graphic should be tagged as a heading (h2)
  - On the Journal page, article titles in the ASAP Articles, Current Issue, Most Read, and ACS Editors' Choice sections should be tagged as h3s, not h4s
  - On the List of Issues page, "Archive of 2019 Online Issues" should be tagged as a heading (h2)

- o On the Issue page, "About the Cover:" and "In this issue" should be tagged as h2s, not h6s
  - o On the Issue page, "INTRODUCING OUR AUTHORS", "REVIEWS", "LETTERS", etc. should be tagged as h2s, not h6s
  - o On the Issue page, subheadings under "INTRODUCING OUR AUTHORS", "REVIEWS", "LETTERS", etc. (e.g., "Introducing Our Authors", "Specific Recognition of Promoter...", etc.) should be tagged as h3s, not h5s
  - o On the Article page, the invisible element (article name) in the page header should not be tagged as a heading
  - o On the Article page, "Article Views", "Altmetric", and "Citations" should be tagged as h2s, not h6s (or should be in a list and not tagged as headings)
  - o On the Article page, sub-headings in the article should be tagged as h3s, not h2s (e.g., "Figure 1", "Structure and Function of G4s")
- On the Home page, the Browse Publications panel is incorrectly contained in a one-item list. [WCAG 2.0 SC 1.3.1]
- On the Home page, the lists under the Browse Publications (List View) tab and "Trending ACS Articles" are not coded as programmatic lists. [WCAG 2.0 SC 1.3.1]
- PDF is untagged, and provides no structural information to assistive technologies. [WCAG 2.0 SC 1.3.1]
- On the Search Results page, result headings (article names) should come before content they organize (e.g., "ARTICLE" and journal logos). [WCAG 2.0 SC 1.3.2]
- On the Article page, an invisible element (article name) is incorrectly read out between the ACS Publications logo in the header and the search input. [WCAG 2.0 SC 1.3.2]
- The language of the PDF is not defined. [WCAG 2.0 SC 3.1.1]

Keyboard Support

- On all pages except Home, radio buttons in the search panel cannot be reached via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Home page, the Trending ACS Articles Altmetric popups cannot be opened via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Home page, checkboxes under "Subjects" in Browse Publications (List View) cannot be reached via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Search Results page, radio buttons and checkboxes in the Refine Search panel cannot be reached via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Issue page, image links to switch to alternate covers cannot be reached via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Article page, the Altmetric popups cannot be opened via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Article page, the "Add to" button cannot be reached via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Article page, the right sidebar cannot be closed via keyboard (cannot reach "x" button). [WCAG 2.0 SC 2.1.1]
- On the Article page, the "Recommended Articles" panel cannot be expanded or collapsed via keyboard. [WCAG 2.0 SC 2.1.1]
- On the Home page, image links under "More Stories Like This" incorrectly receive focus twice. [WCAG 2.0 SC 2.4.3]

- On the Home page, focus incorrectly goes to the page behind the Publications lightbox when it is open. [WCAG 2.0 SC 2.4.3]
- On the Article page, focus does not immediately move into Reference QuickView lightbox when it is opened. [WCAG 2.0 SC 2.4.3]
- On the Article page, focus goes to content in the "Recommended Articles" panel when it is collapsed. [WCAG 2.0 SC 2.4.3]
- On the Article page, figure citations are incorrectly broken into two links (e.g., "Figure" and "1" are reached separately, instead of "Figure 1" being a single link). [WCAG 2.0 SC 2.4.3]
- Focus is not sufficiently visible for most interactive content on the site (e.g., text links, image links, dropdowns). [WCAG 2.0 SC 2.4.7]
- The static top bar obscures focused content throughout the site. [WCAG 2.0 SC 2.4.7]
- The Search panel unexpectedly opens/expands when focus reaches the search input. [WCAG 2.0 SC 3.2.1]

Navigation

- The title of the Search Results page is not sufficiently descriptive (no mention of site name). [WCAG 2.0 SC 2.4.2]
- PDF is not titled. [WCAG 2.0 SC 2.4.2]
- On the Journal page, it is not clear to screen reader users that journal cover links will open a specific issue ("cover" is the alternative text, which implies that it will open an expanded view of the cover). [WCAG 2.0 SC 2.4.4, WCAG 2.0 SC 1.1.1]
- On the Search Results, Journal, and Issue pages, no means to bypass repeated navigation exists (no h1 at the start of unique page content and no "Skip to Main" link provided). [WCAG 2.0 SC 2.4.1]

Forms and Data Submission

- On the Home page, the dropdown in the search panel is not labeled. [WCAG 2.0 SC 3.3.2]
- On the Search Results page, the "Topic" and "Published in" text inputs in the Advanced Search tab of the Refine Search panel are not labeled. [WCAG 2.0 SC 3.3.2]

Images

- A variety of images throughout the site do not have appropriate alternative text. [WCAG 2.0 SC 1.1.1]
  - ACS Publications logo in page header ("logo" is not sufficient alternative text)
  - "Blank image" is not acceptable alternative text (content in page header)
  - "BEHIND EVERY ARTICLE, THERE'S A PERSONAL STORY OF DISCOVERY" on the Home page
  - Images in "ACS Editors" Choice" should not have alternative text that duplicates the text that immediately follows on the Home page
  - Navigation dots in the "ACS Editors" Choice" panel on the Home page
  - Journal logos on the Search Results, Journal, and List of Issues pages (e.g., "Journal logo" is not appropriate alternative text for "ACS Chemical Biology")
  - Issue covers are decorative, and should have null alternative text (alt="") on the List of Issues page

- o   Images from Reviews, Letters, and Articles on the Issue page
- o   All figures in the article on the Article page
- On the Journal page, the alternative text assigned to journal cover links ("cover") does not describe the purpose of the links (no indication is given that they link to issues). [WCAG 2.0 SC 1.1.1, WCAG 2.0 SC 2.4.4]
- Images in the PDF do not have alternative text. [WCAG 2.0 SC 1.1.1]
- On the Home page, "Most Trusted. Most Cited. Most Read." and "BEHIND EVERY ARTICLE, THERE'S A PERSONAL STORY OF DISCOVERY" are images of text, instead of styled text. [WCAG 2.0 SC 1.4.5]
- On the Search Results, Issue, and Article pages, "Subscribed" is an image of text, instead of styled text. [WCAG 2.0 SC 1.4.5]

Color and Visual Characteristics

- Grey text on light grey background (e.g., placeholder text in search inputs; tabs on List of Issues page; all text at top of Issue page), blue text on white (text in "Stay Connected..." section on Home and Journal pages), grey on white (e.g., navigation dots in "ACS Editors" Choice" panel, dates under video links, arrows in "Browse by Subject" tab on Home page; navigation dots in "ASAP Articles" panel and arrows in Browse by Subject panel on Journal page; "RETURN TO ISSUE", "< PREV", "Article Views", "Share", "Jump To" on Article page), light grey on white (e.g., checkboxes in "Browse Publications" tab on Home page; "Sort By:" and dropdown on Issue page), orange text on grey (e.g., selected tab under "Trending ACS Articles" on Home page), white text on multicolored backgrounds (e.g., video captions on Home page), light blue text on grey (results per page and "Sort" value on Search Results page), white text on green (e.g., "Submit Manuscript" on Journal page), white text on light blue (e.g., "Subscriber Info" and "Get e-Alerts" on Journal page; "Get e-Alerts" on List of Issues page), teal text on white and grey (e.g., headings in PDF), white text on teal (e.g., "Reviews" in PDF), and white text on lime green (e.g., "iD" in PDF) have insufficient contrast. [WCAG 2.0 SC 1.4.3]
- On the Home page, color alone is used to indicate the selected tab in the Browse Publications section. [WCAG 2.0 SC 1.4.1]
- On the Search Results page, color alone is used to highlight search terms. [WCAG 2.0 SC 1.4.1]
- On the Search Results page, color alone is used to indicate the selected search results page number and the selected tab in the Refine Search panel. [WCAG 2.0 SC 1.4.1]

Custom Elements and Dynamic Content

- Role and value (i.e., that it expands and whether it is expanded or collapsed) are not provided for the menu icon, and screen readers are not notified when it is opened or closed. [WCAG 2.0 SC 4.1.2]
- Incorrect values are provided for options in the search autocomplete (the typed search term is read out instead of the option name; e.g., "nucleic" instead of "Nucleic Acids: Curvature and Deformation"). [WCAG 2.0 SC 4.1.2]
- Screen readers are not notified when lightboxes (e.g., Publications lightbox on Home page and Reference QuickView lightboxes on Article page) are opened or closed. [WCAG 2.0 SC 4.1.2]
- On the Home page, values (i.e., which option is selected) are not provided for Content Types in Browse Publications (List View) and drill-downs in Browse by

Subject view, and screen readers are not notified when a selection is made. [WCAG 2.0 SC 4.1.2]

- On the Home page, roles and values (i.e., that they are tabs and whether they are selected) are not provided for tabs under "Trending ACS Articles". [WCAG 2.0 SC 4.1.2]
- On the Search Results page, names are not provided for applied filters (e.g., "Last Month", "Journal Article"); only "Remove Filter link" is read out by screen readers. [WCAG 2.0 SC 4.1.2]
- On the Search Results page, role and value (i.e., that it expands/collapses and whether it is expanded or collapsed) are not provided for the "REFINE SEARCH" expander, and screen readers are not notified when it is opened or closed. [WCAG 2.0 SC 4.1.2]
- On the Search Results page, values (i.e., whether they are selected) are not provided for tabs within the Refine Search panel (e.g., "Advanced Options", "Search History"). [WCAG 2.0 SC 4.1.2]
- On the Search Results page, values (option names) are not read out in dropdowns in the Advanced Search tab of the Refine Search panel, and screen readers are not notified when a selection is made. [WCAG 2.0 SC 4.1.2]
- On the List of Issues page, incorrect values are provided for collapsed tabs (they are announced as "expanded"). [WCAG 2.0 SC 4.1.2]
- On the Issue page, values (option names) are not read out in the Sort By dropdown, and screen readers are not notified when it is opened, closed, or a selection is made. [WCAG 2.0 SC 4.1.2]
- On the Article page, screen readers are not notified when a "Jump To" option is selected. [WCAG 2.0 SC 4.1.2]

Home Page Screenshot