MAFMC Deep Sea Corals Fishery Management Action Team (FMAT)
1/20/15 Call Summary

FMAT Attendees: Kiley Dancy (MAFMC), Katie Richardson (NMFS GARFO), Carly Bari (NMFS GARFO), David Stevenson (NMFS GARFO), David Packer (NMFS NEFSC), Drew Kitts (NMFS NEFSC)

Additional Participants: Jason Didden (MAFMC), Martha Nizinski (NMFS National Systematics Lab), Fan Tsao (NOAA DSCRTP), Michelle Bachman (NEFMC)

The FMAT met via webinar at 1:30 p.m. on Tuesday, January 20, 2015 to discuss recommendations for the MAFMC's Deep Sea Corals Amendment. The following summarizes FMAT guidance and recommendations for the Council's selection of preferred alternatives, as well as additional comments and clarifications regarding some questions and concerns that the FMAT has received during the public hearing process.

Broad coral zone designation

Regarding the alternatives in the document for broad coral zone designation, the FMAT noted the following for the Council to consider:

- The additional coral protections gained by moving from a deeper broad zone (400 or 500 meters) to a shallower broad zone (200 or 300 meters) may not be enough to justify the increased negative economic impacts to the affected fisheries given that the 400m and 500m broad zones would cover 97% and 93% respectively of high/very high coral likelihood areas. If the Council's intention is to "freeze the footprint" of current fishing effort in the broad zones, it appears that besides red crab fishing, most fishing effort drops off by 400 meters. For coral impacts in broad zones, see Table 21 in the Public Information Document (PID), as well as description of the coverage of suitable habitat for each proposed broad zone on page 68. For economic impacts in broad zones, see section 7.3 of the PID.
- The FMAT discussed the depth profiles of recent research expeditions and noted that there were few recent dives conducted at depths less than 500 meters. However, there are a few exceptions. For example, in Wilmington Canyon, high coral abundance and diversity was observed at depths of approximately 300 meters. This indicates that discrete zones would be particularly important in some areas if the Council chose a deeper broad zone alternative and also wished to provide increased protection in canyon areas with high coral abundance. In general, the FMAT felt there was not enough recent information to draw additional conclusions about the protection value for corals at shallower depths.
- In response to public hearing comments regarding broad zone depth contours not having been finalized (since they need to be translated into enforceable points and lines on a map), the FMAT agreed that the Council and public should have an understanding of how the depth contours will be approximated. The FMAT decided that Council staff would create a boundary (or methodology for creating a boundary) to approximate the various depth contours, and that the FMAT would review that product via email. The FMAT also suggested that Council members and advisors could provide input on specific areas along the shelf break where it is more critical that the lines be better defined (i.e., more complex).

Broad coral zone management measures

- In terms of management measures within a potential broad zone, the FMAT noted that restricting all bottom tending-gear is more proactive and more in line with the purpose and need of the amendment as well as the "freeze the footprint" approach. Given that gear types beyond trawling can have an impact on corals, the FMAT recommended that the "freeze the footprint" approach include all bottom tending gear types, with exceptions as discussed below.
- For exemption sub-alternatives (applicable only if "prohibit all bottom-tending gear," alternative 2B, is selected), the FMAT recommended the following:

    - If the Council selects a 400 or 500 meter broad zone as a preferred alternative, there does not appear to be a strong case for exempting the golden tilefish bottom longline fishery according to the fishery effort information analyzed in the PID. If a shallower broad zone (200 or 300 meters) is chosen, there would be some justification for exempting the golden tilefish fishery under the "freeze the footprint" principle. The FMAT also noted the relatively small amount of tilefish longlining activity that appears to be occurring beyond 300 meters (see Figure 33; Tables 34 and 43 in PID).
    - For all potential broad zones, the FMAT agreed that an exemption for the red crab trap fishery is justified. Almost all fishing activity for red crab occurs deeper than 550 meters, and thus would be severely impacted by any of the proposed broad zones. The red crab fishery is a limited access fishery consisting of only four vessels.
- The FMAT supports requiring VMS for all vessels fishing within broad zones, in order to enforce any restrictions.

<u>Discrete coral zone designations</u>

- The FMAT noted that the map for Wilmington Canyon and North Heyes-South Wilmington Canyons was inadvertently left out of the PID. It is provided here in Figure 1.
- The FMAT noted that if the Council designates a broad coral zone, this would simplify prioritization of discrete zones, given that significant portions of the proposed discrete zone areas would be covered by a broad zone. If a broad zone is designated, the FMAT recommends that the Council prioritize the five canyons that significantly incise the shelf/slope break and extend into shallower water on the shelf, and consider them separately from the other 14 discrete zones that are in deeper water on the continental slope. These areas include Wilmington, Norfolk, Baltimore, Hudson, and Washington Canyons.
- In the absence of a broad zone, prioritization of discrete zones is more difficult. However, the FMAT agreed that the previously mentioned five canyons that incise the shelf still stand out as being higher priorities for coral protection. The number of coral observations (recent and historic) in these canyons is generally higher (with the exception of Hudson Canyon), as is the total amount of suitable habitat. There are a good number of recent observations of corals in Wilmington, Norfolk, Baltimore, and Washington Canyons. The FMAT indicated a preference for prioritizing canyons with high total area of high/very high habitat suitability, and thus considered the Mey-Lindenkohl and Warr-Phoenix slope areas to be additional priority candidates for discrete zone protection in the absence of a broad zone alternative.
- The FMAT considered the question of how much area of high habitat suitability falls <u>within</u> the discrete broad zones but <u>outside</u> of the proposed broad zones, given that the broad zone areas overlap much of the proposed discrete zone areas. The FMAT felt it was important to take a closer look at the locations and extent of discrete areas and suitable coral habitat falling outside broad zones to better inform the Council in choosing broad and discrete alternatives. Tables 1 and 2 provide the total area and area of high habitat suitability for each discrete zone extending beyond each of the proposed broad zones, and these areas are also mapped in Figures 2-9.

<u>Discrete zone management measures</u>

The FMAT did not come to an agreement on a recommendation for gear restrictions to be applied within discrete zones. Because these areas are not proposed under the "freeze the footprint" objective and are associated with more fishing effort in the heads of the canyons, the FMAT indicated that this decision should be based on the Council's priorities for balancing tradeoffs. Additionally, different canyon areas have more or less importance for different gear types and fisheries, which the Council could consider when specifying management measures.

<u>Framework provisions</u>

The FMAT supports the proposed framework alternatives in the document (alternatives 5B through 5E). These alternatives would simplify any future modifications to deep sea coral measures.

<u>Vessel Monitoring Systems requirement for *Illex* squid vessels</u>

The FMAT supports the proposed requirement for *Illex* squid moratorium vessels to use VMS.

<u>Additional Comments</u>

Questions and concerns have been raised about the following issues during the public hearing process, as well as through inquiries directed to the FMAT:

- Questions regarding the inputs and outputs associated with the habitat suitability model produced by NOAA's Northeast Fisheries Science Center (NEFSC) and the National Ocean Service's National Centers for Coastal and Ocean Science (NOS/NCCOS)[1]
- Questions about the validity and accuracy of the historical deep sea coral database maintained by NOAA's Deep Sea Coral Research and Technology Program (DSCRTP)
- Provisions for "haulback zones" for squid trawlers in key areas where gear is deployed and retrieved
- Transit provisions for any potential deep sea coral zones

The following section provides some additional background information, clarifying comments, or suggestions regarding these issues.

Habitat Suitability Model

The deep sea corals habitat suitability model is a MaxEnt model.[2] This approach takes known deep sea coral locations (from the DSCRTP historical database), and combines this data with environmental predictor inputs such as depth, slope, temperature, substrate type, and many more variables to generate predictive models of deep sea coral distribution. The model developers selected this type of model because of its usefulness for data sets that are presence-only. The project description and links to the full digital data package can be found at: http://coastalscience.noaa.gov/projects/detail?key=35.

The FMAT notes that the model has performed well in initial groudtruthing, and represents the best relevant scientific information available to the Council at this time since it incorporates established factors supporting coral presence. Historical coral records, including from observer data, are limited, and much of the region has not been explored for the presence of deep sea corals. Where coral presence is suspected but not confirmed, the best tool for determining where corals are likely to be located is a predictive model. The project page for the model states that: "The distribution of deep-sea coral is poorly understood because of the logistical difficulty and expense of surveying the deep ocean. Predictive modeling of deep-sea coral habitats is essential for supporting conservation planning and for targeting areas for future mapping and exploration. Modeling can also lead to insights into the environmental factors driving the distribution of deep-sea corals, helping to build our knowledge base of how these unique ecosystems function."

The habitat suitability model has been internally reviewed by NCCOS and NEFSC to meet technical standards for data quality, and detailed metadata have been produced and made publicly available as part of the full data package (see link above). The model output package was subsequently provided to the NOAA Coastal Services Center/Bureau of Ocean Energy Management's Multipurpose Marine Cadastre, where it underwent another review

[1] Kinlan BP, Poti M, Drohan A, Packer DB, Nizinski M, Dorfman D, Caldow C. 2013. Digital data: Predictive models of deep-sea coral habitat suitability in the U.S. Northeast Atlantic and Mid-Atlantic regions. Downloadable digital data package. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Centers for Coastal Ocean Science (NCCOS), Center for Coastal Monitoring and Assessment (CCMA), Biogeography Branch. Released August 2013. Available at: <http://coastalscience.noaa.gov/projects/detail?key=35>. Funding for this research was provided by the National Marine Fisheries Service - Northeast Fisheries Science Center, the NOAA Deep Sea Coral Research and Technology Program, and the National Ocean Service - National Centers for Coastal Ocean Science.

[2] http://www.cs.princeton.edu/~schapire/maxent/

process with internal and external reviewers. The model description and results are being prepared for submission to a journal in the near future.[3]

Preliminary data indicate that the habitat suitability model has performed extremely well when field-tested during recent research expeditions. That is, a subset of locations that the model has predicted as highly likely to contain suitable deep sea coral habitat has been explored using towed cameras and Remotely Operated Vehicles, and most of these tested sites were found to contain deep sea corals and/or suitable habitat. This process, referred to as "groundtruthing," was conducted on recent expeditions on both the *Bigelow* and on the *Okeanos Explorer*. Groundtruthing results are incomplete and have not been peer reviewed; however, preliminary results indicate strong model performance in predicting areas with high habitat suitability for deep sea corals. Some research dives have also tested areas where the model predicted low habitat suitability, and found few or no corals. A technical memo and/or peer-reviewed journal article on these groundtruthing efforts is expected in 2016.

As new information becomes available from recent deep sea research expeditions, the predictive habitat suitability model will be improved by incorporating this information over the next few years. There are also plans to improve the spatial resolution of the model (from the current 370 meter grid cell size to 25 meters). The Council may choose to consider new information as it becomes available and potentially modify any designated measures for deep sea corals.

Deep sea coral historical database

There are two main types of deep-sea coral data for the northeast and mid-Atlantic regions: geo-referenced presence records and non-geo-referenced presence records (i.e., "observations"). There is also a small amount of deep-sea coral density or abundance data, but it is too problematic to be useful. Coral geo-referenced presence data from Maine to Cape Hatteras was derived from the Cold-water Coral Geographic Database (CoWCoG)[4] developed by the USGS with support from NOAA's DSCRTP. The geodatabase consolidates the known locations of deep-sea corals from this area, with records from the late 1800s to the present coming from previous peer-reviewed databases,[5,6] museum archives, field surveys, deep-sea coral data mining projects, and historical and recent literature. As an example: the Watling et al. (2003) database obtained records of alcyonacean coral occurrences from a variety of sources, including Verrill, Deichmann,[7] Hecker and collaborators,[8,9,10] Yale Peabody museum collections, the NEFSC benthic database of identified coral taxa,[11] and observations from recent National Undersea

[3] Kinlan, B.P., M. Poti, A.F. Drohan, D.B. Packer, D.S. Dorfman, and M.S. Nizinski. 2015. Predictive modeling of suitable habitat for deep-sea corals offshore of the northeast United States. *Deep Sea Research Part I: Oceanographic Research Papers.* In prep.

[4] Scanlon K.M., Waller R.G., Sirotek A.R., Knisel J.M., O'Malley J.J., Alesandrini S. (2010) USGS cold-water coral geographic database - Gulf of Mexico and Western North Atlantic Ocean. Version 1.0. USGS Open File Report 2008-1351. http://pubs.usgs.gov/of/2008/1351/

[5] Theroux, R.B. & Wigley, R.L. (1998) Quantitative composition and distribution of the macrobenthic invertebrate fauna of the continental shelf ecosystems of the northeastern United States. US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Scientific Publications Office.

[6] Watling, L., Auster, P., Babb, I., Skinder, C., Hecker, B. (2003). A geographic database of deepwater alcyonaceans of the northeastern U.S. continental shelf and slope. Version 1.0 CD-ROM. Nat. Undersea Res. Cent., Univ. Conn., Groton.

[7] Deichman, E. (1936). The Alcyonaria of the western part of the Atlantic Ocean. Harvard University, Memoirs of the Museum of Comparative Zoology 53: 1-317.

[8] Hecker, B., Blechschmidt, G. (1980). Final historical coral report for the canyon assessment study in the Mid- and North Atlantic areas of the U.S. outer continental shelf: epifauna of the northeastern U.S. continental margin. Appendix A. In: Canyon Assessment Study. U.S. Dep. Int., Bur. Land Manage., Washington, DC, No. BLM-AA551-CT8-49.

[9] Hecker, B., Blechschmidt, G., Gibson, P. (1980). Final report for the canyon assessment study in the Mid- and North Atlantic areas of the U.S. outer continental shelf: epifaunal zonation and community structure in three Mid- and North Atlantic canyons. In: Canyon Assessment Study. U.S. Dep. Int., Bur. Land Manage., Washington, DC, No. BLM-AA551-CT8-49. p. 1-139.

[10] Hecker, B., Logan, D.T., Gandarillas, F.E., Gibson, P.R. (1983). Megafaunal assemblages in Lydonia Canyon, Baltimore Canyon, and selected slope areas. In: Canyon and slope processes study: Vol. III, biological processes. Final report for U.S. Dep. Int. Mineral Manage. Ser. No. 14-12-001-29178. p. 1-140.

[11] Theroux, R.B. & Wigley, R.L. (1998) Quantitative composition and distribution of the macrobenthic invertebrate fauna of the continental shelf ecosystems of the northeastern United States. US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Scientific Publications Office.

Research Center (NURC) field studies.[12] The geodatabase has been vetted and has undergone quality assurance/quality control by the authors and the DSCRTP; for details on the sources of the geo-referenced presence records in the database, see Packer et al. (2007)[13] and Packer et al. (in review).[14] The habitat suitability model was run using additionally vetted and corrected georeferenced records from the historical database (e.g., taxonomies were recertified, questionable entries were removed). Although some of the older records may have positional inaccuracies due to more imprecise navigation techniques used at the time of observation, the habitat suitability upon which the proposed alternatives are based has a fairly broad resolution (370 meter grid cell size), lessening the effects of any minor positional inaccuracies in the underlying data.

Haulback zones

The "Considered but Rejected" section of the PID describes the previous FMAT recommendation that comments be solicited during the public hearing process regarding the issue of haulback zones. Haulback zones would be areas in and around the proposed discrete zones where vessel operators would be permitted to set and retrieve their gear, if that gear is off the seafloor and not actively fishing. Trawl gear can extend significantly behind a vessel, and thus a vessel may need to drift or move into and around a discrete coral zone in order to set or haul their gear for fishing just outside of a designated area.

To date, several public comments received on this issue have indicated a need for development of haulback zones, but there have been no specific proposals on how these would be designated or enforced.

Transit Provisions

Transit provisions would lessen the impact of the discrete areas on vessels (otherwise vessels would be required to transit around them), but these provisions complicate enforcement of area-based management. The Council could also consider VMS declarations for transiting. Current regulations specify the following definition for gears that are not available for immediate use, which is often included when allowing for transit:

Not available for immediate use means that the gear is not being used for fishing and is stowed in conformance with one of the following methods:

(1) Nets—(i) Below-deck stowage. (A) The net is stored below the main working deck from which it is deployed and retrieved;
(B) The net is fan-folded (flaked) and bound around its circumference.
(ii) On-deck stowage. (A) The net is fan-folded (flaked) and bound around its circumference;
(B) The net is securely fastened to the deck or rail of the vessel; and
(C) The towing wires, including the leg wires, are detached from the net.
(iii) On-reel stowage. (A) The net is on the net reel;
(B) The codend of the net is removed from the net and stored below deck; and
(C) The entire surface of the net is covered and securely bound by:
(1) Canvas of other similar opaque material; or
(2) A highly visible orange or yellow mesh material that is not capable of catching fish or being utilized as fishing gear. An example of highly visible orange or yellow mesh includes but is not limited to the orange fence material commonly used to enclose construction sites.

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[12] For more information about the Watling and Auster database, see: Watling L., Auster P. (2005) Distribution of deep-water Alcyonacea off the northeast coast of the United States. In: Freiwald A., Roberts J.M. (eds) Cold-water corals and ecosystems. Springer-Verlag, Berlin, p 259-264.

[13] Packer D.B., Boelke D., Guida V., McGee L-A. (2007) State of deep coral ecosystems in the Northeastern US region: Maine to Cape Hatteras. In: Lumsden S.E., Hourigan T.F., Bruckner A.W., Dorr G. (eds) The state of deep coral ecosystems of the United States. NOAA Tech Memo CRCP-3, p. 195-232

[14] Packer, D.B., Nizinski, M.S., Bachman, M.S., Drohan, A.F., Poti, M., Kinlan, B.P. (In Review) State of deep coral ecosystems in the Northeastern US region update: Maine to Cape Hatteras.

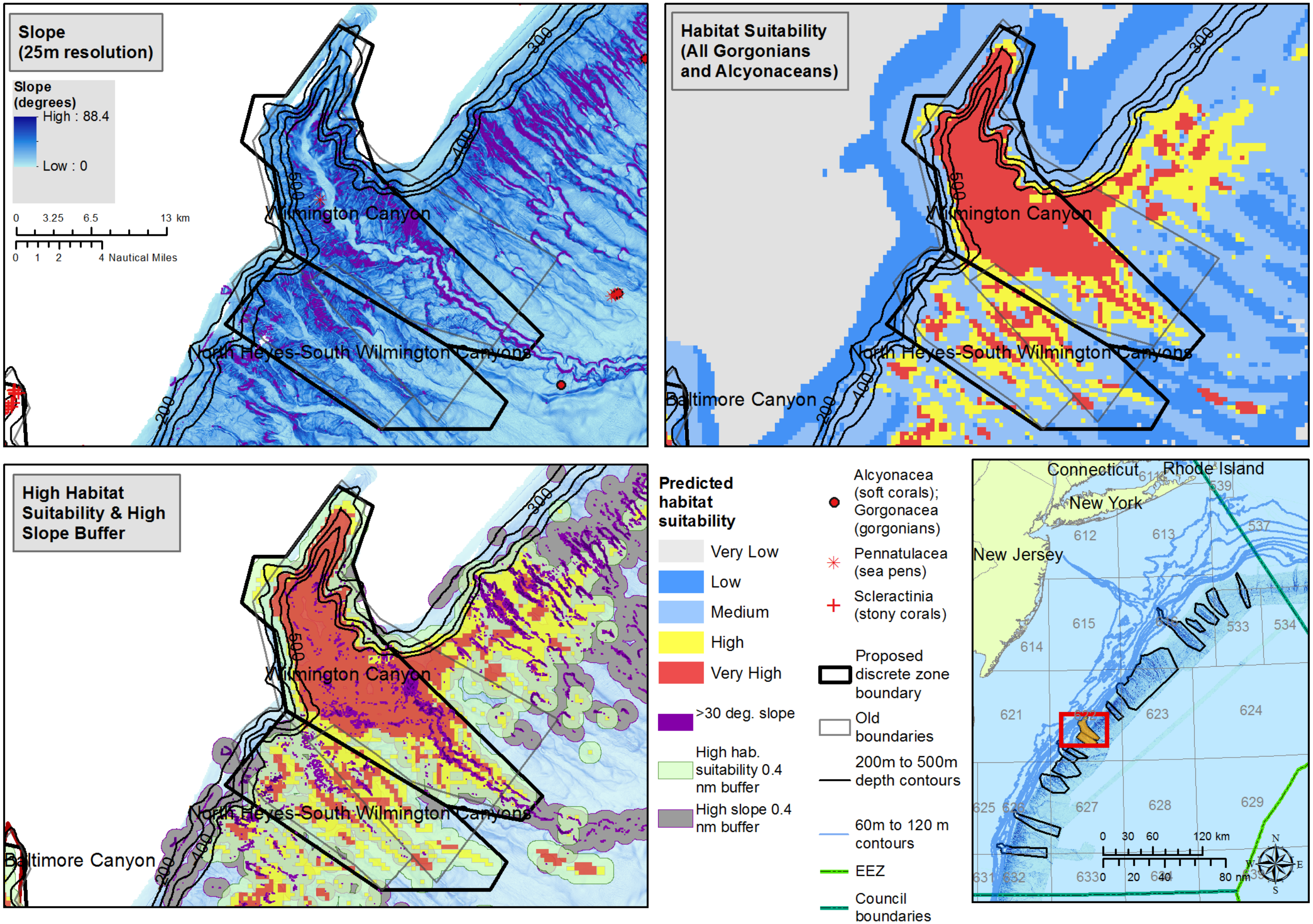

Figure 1: Wilmington and North Heyes-South Wilmington Canyons (two separate proposed discrete zones under alternative 3B).

Table 1: Total area and total area of high habitat suitability falling within proposed discrete zones (Alt 3B) but outside proposed broad zones.

	Total area (km^2) falling outside 200 meter broad zone	**Area (km^2) of high/very high habitat suitability outside 200 m broad zone**	**Total area (km^2) falling outside 300 meter broad zone**	**Area (km^2) of high/very high habitat suitability outside 300 m broad zone**	**Total area (km^2) falling outside 400 meter broad zone**	**Area (km^2) of high/very high habitat suitability outside 400 m broad zone**	**Total area (km^2) falling outside 500 meter broad zone**	**Area (km^2) of high/very high habitat suitability outside 500 m broad zone**
Block Canyon	0.1	0.0	8.1	0.0	20.4	1.5	36.4	1.8
Ryan-McMaster Canyons	0.0	0.0	0.0	0.0	2.5	0.1	27.3	5.5
Emery-Uchupi Canyons	0.0	0.0	0.4	0.0	5.1	0.1	18.9	2.7
Jones-Babylon Canyons	0.0	0.0	0.0	0.0	0.5	0.0	5.2	0.1
Hudson Canyon	29.7	0.1	80.7	5.2	132.5	31.1	178.8	66.9
Mey-Lindenkohl Slope	34.2	7.7	101.4	12.4	201.7	25.5	301.7	62.6
Spencer Canyon	0.9	0.0	8.6	0.0	17.3	0.7	23.2	3.3
Wilmington Canyon	24.8	1.9	49.8	12.0	71.5	30.1	89.1	50.1
North Heyes-South Wilmington Canyons	0.0	0.0	1.3	0.0	5.2	0.1	11.8	0.5
South Vries Canyon	1.6	0.0	7.7	0.0	12.4	0.0	16.2	0.0
Baltimore Canyon	26.0	2.8	47.4	8.6	65.2	20.0	79.0	33.4
Warr-Phoenix Canyon Complex	0.4	0.0	4.5	1.0	17.5	2.2	33.6	3.5
Accomac-Leonard Canyons	12.3	4.7	25.9	12.8	47.0	20.2	65.5	24.7
Washington Canyon	8.5	0.0	19.9	1.6	30.2	7.8	38.7	14.2
Norfolk Canyon	41.6	10.1	62.3	21.0	80.8	36.3	93.4	47.9
TOTAL	**180.2**	**27.3**	**417.8**	**74.7**	**709.9**	**175.7**	**1018.8**	**317.1**

Table 2: Total area and area of high habitat suitability falling within advisor-proposed discrete zones (Alt 3B-1) but outside proposed broad zones.

	Area (km^2) falling outside 200 meter broad zone	**Area (km^2) of high/very high habitat suitability outside 200 m broad zone**	**Area (km^2) falling outside 300 meter broad zone**	**Area (km^2) of high/very high habitat suitability outside 300 m broad zone**	**Area (km^2) falling outside 400 meter broad zone**	**Area (km^2) of high/very high habitat suitability outside 400 m broad zone**	**Area (km^2) falling outside 500 meter broad zone**	**Area (km^2) of high/very high habitat suitability outside 500 m broad zone**
Mey-Lindenkohl Slope Straight	7.1	0/0	30.0	3.5	56.6	6.5	100.4	16.2
Mey-Lindenkohl Slope Depth-based	0.0	0.0	0.0	0.0	0.0	0.0	46.0	19.6
Baltimore Canyon	1.7	0.0	10.8	2.3	20.6	10.5	29.9	20.8
Norfolk Canyon	4.6	0.2	18.4	8.8	35.0	10.5	46.6	35.0
TOTAL	**13.5**	**0.2**	**59.2**	**14.7**	**112.2**	**27.5**	**222.8**	**91.6**

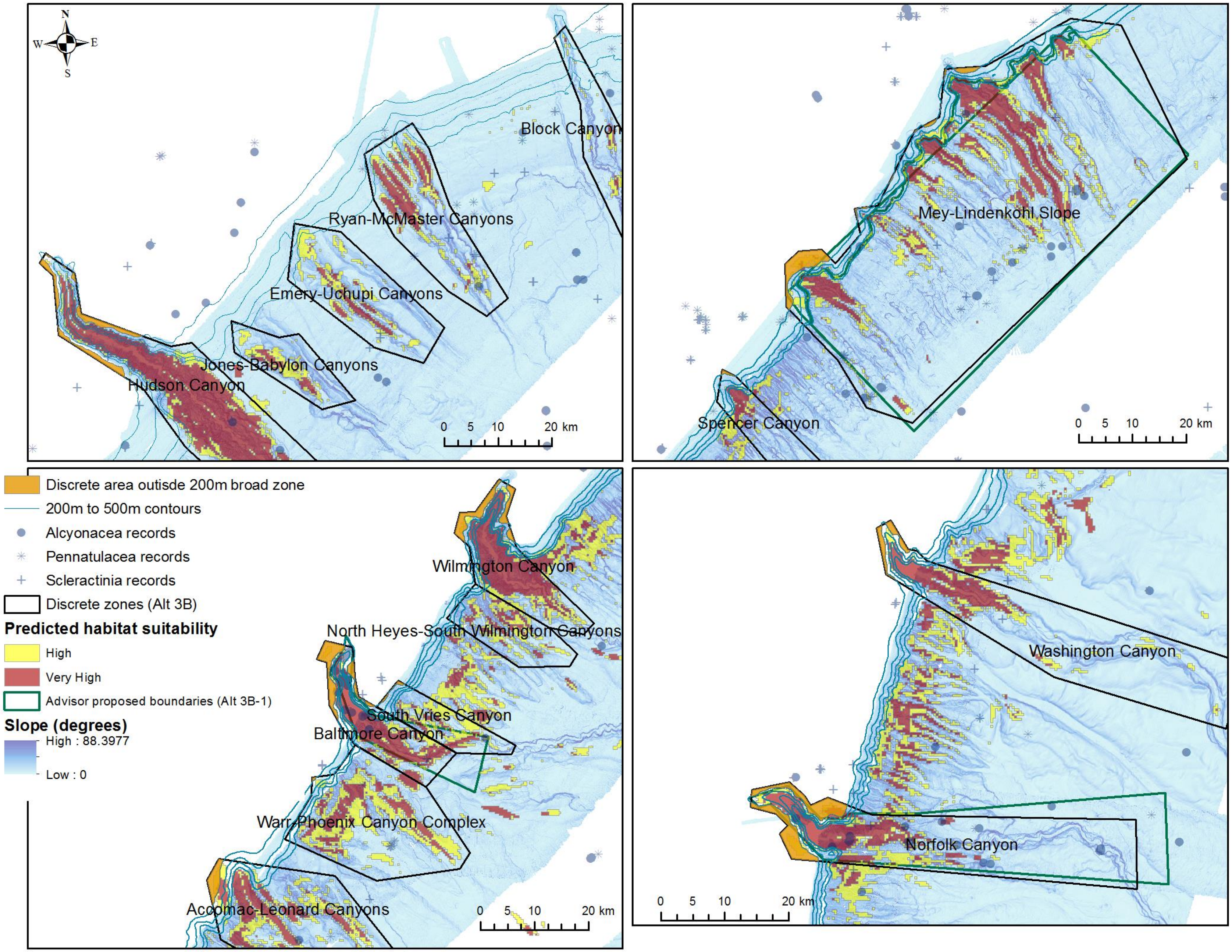

Figure 2: Proposed discrete areas falling outside the 200 meter broad zone.

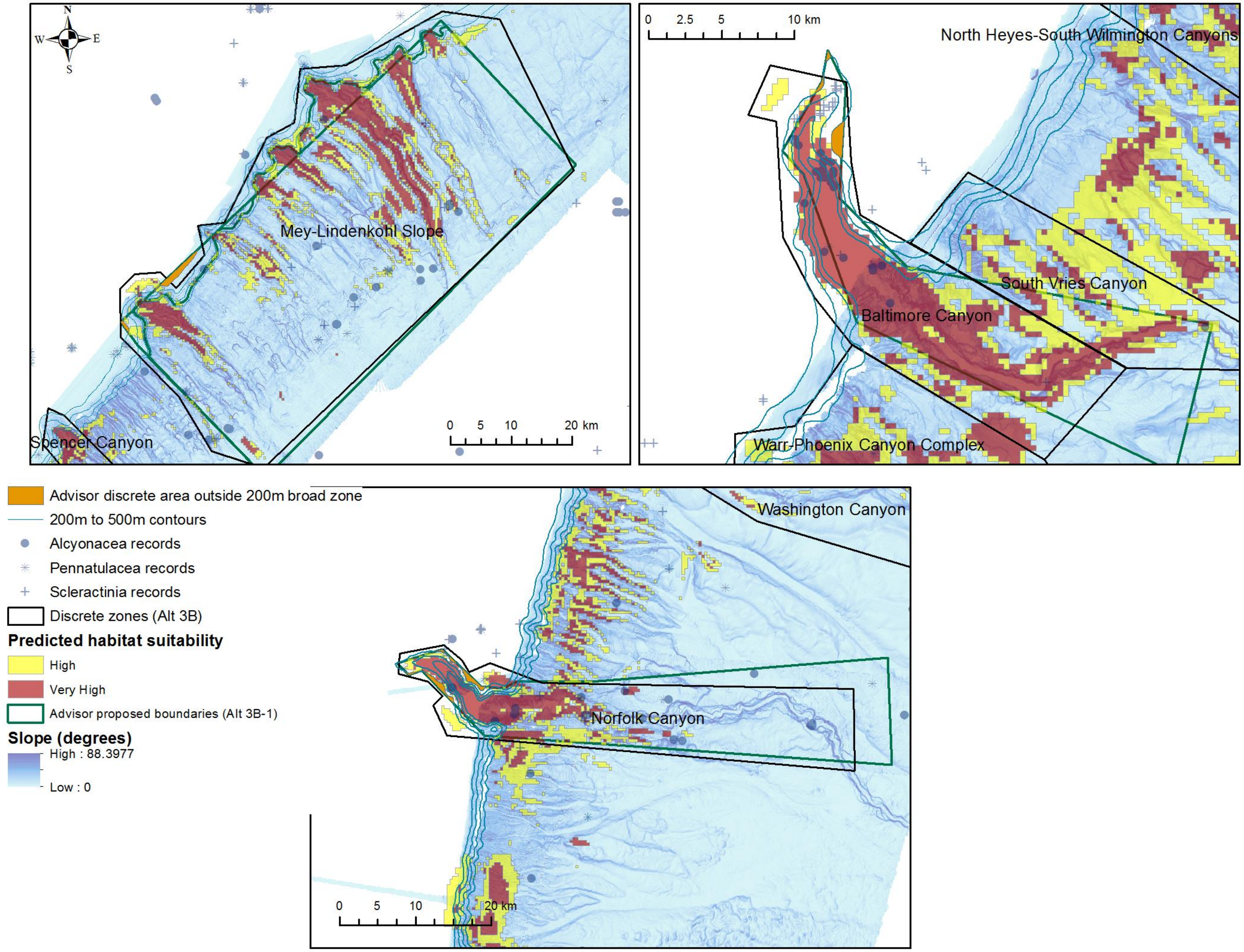

Figure 3: Advisor-proposed discrete areas falling outside the 200 meter broad zone.

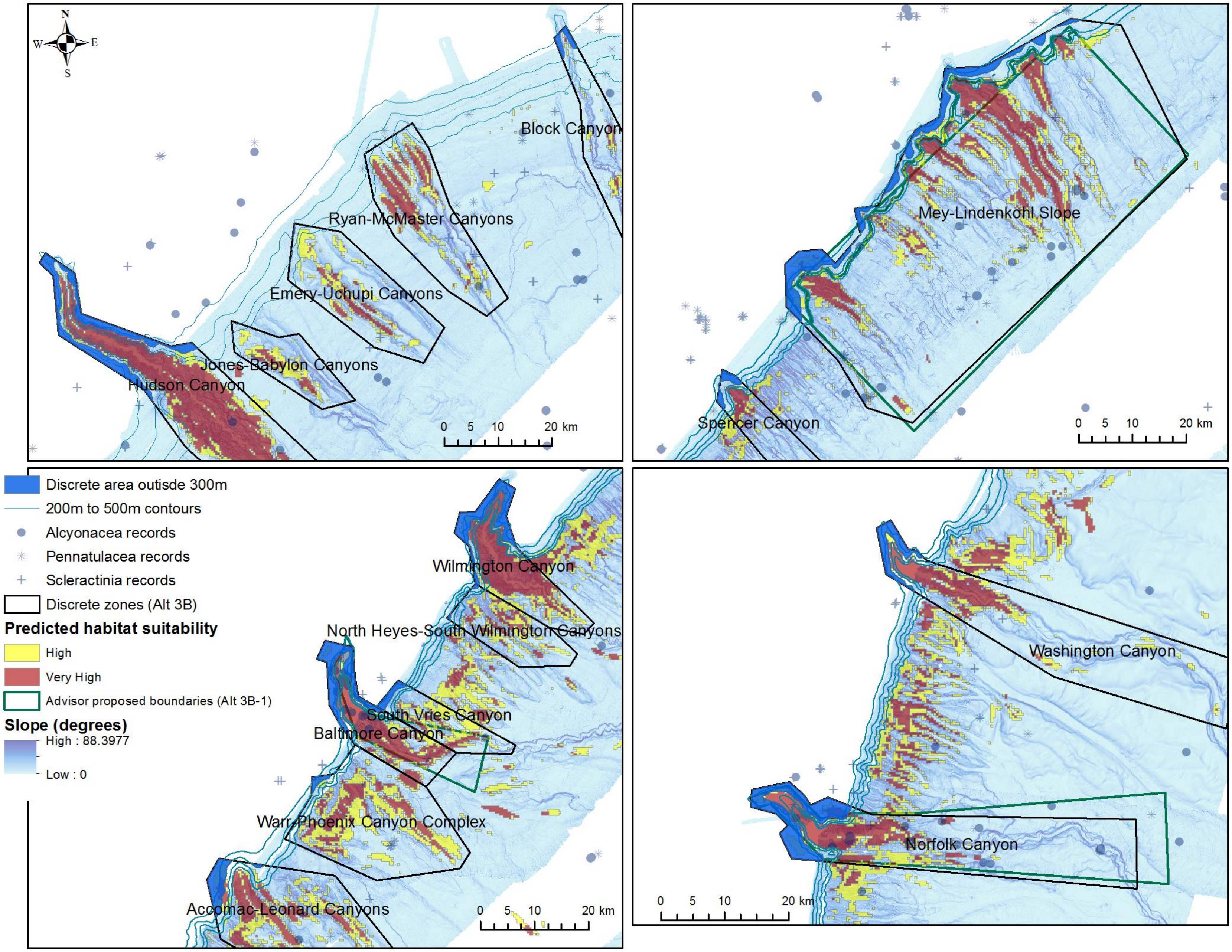

Figure 4: Proposed discrete areas falling outside the 300 meter broad zone.

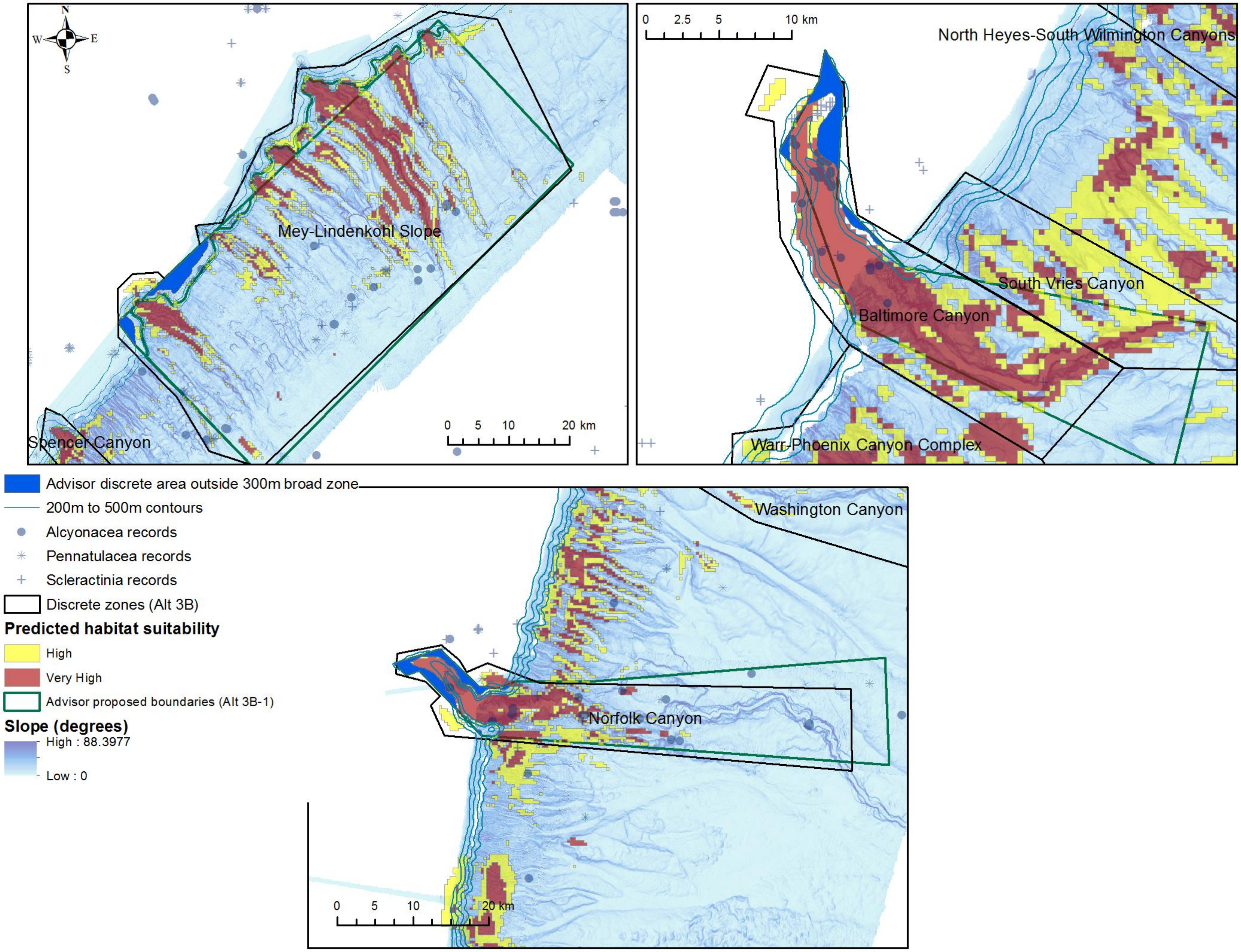

Figure 5: Advisor-proposed discrete areas falling outside the 300 meter broad zone.

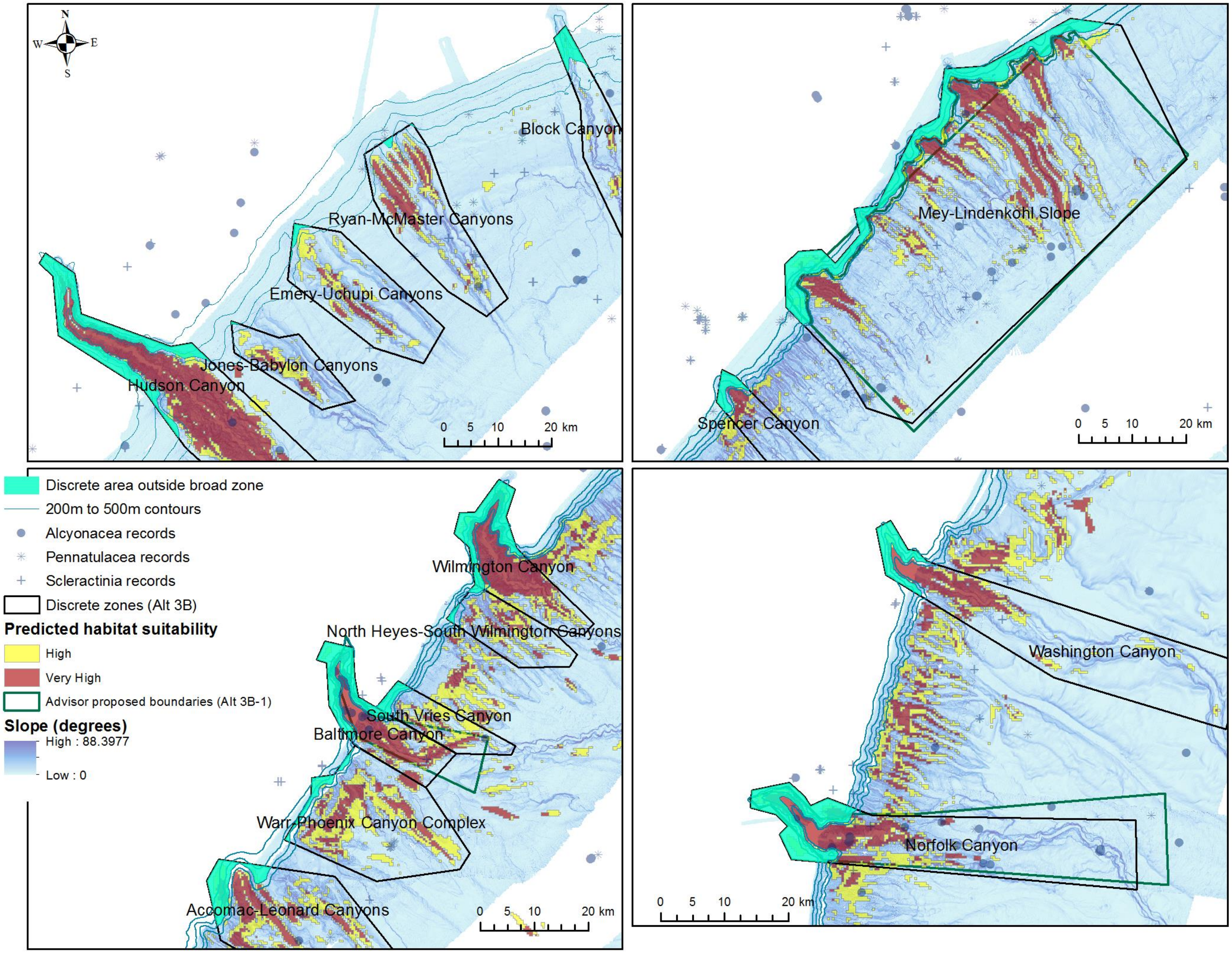

Figure 6: Proposed discrete areas falling outside of the 400 meter broad zone.

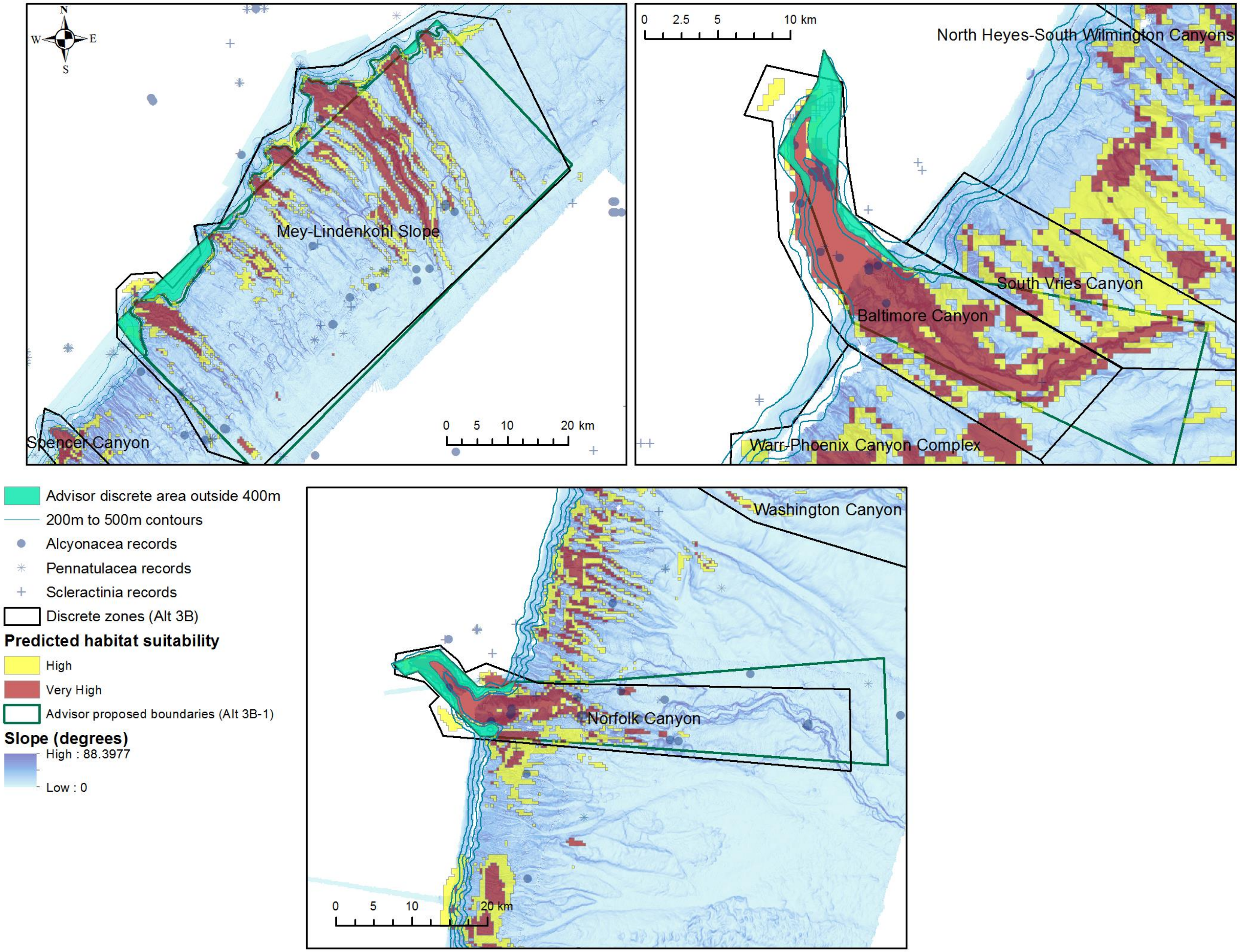

Figure 7: Advisor-proposed discrete areas falling outside the 400 meter broad zone.

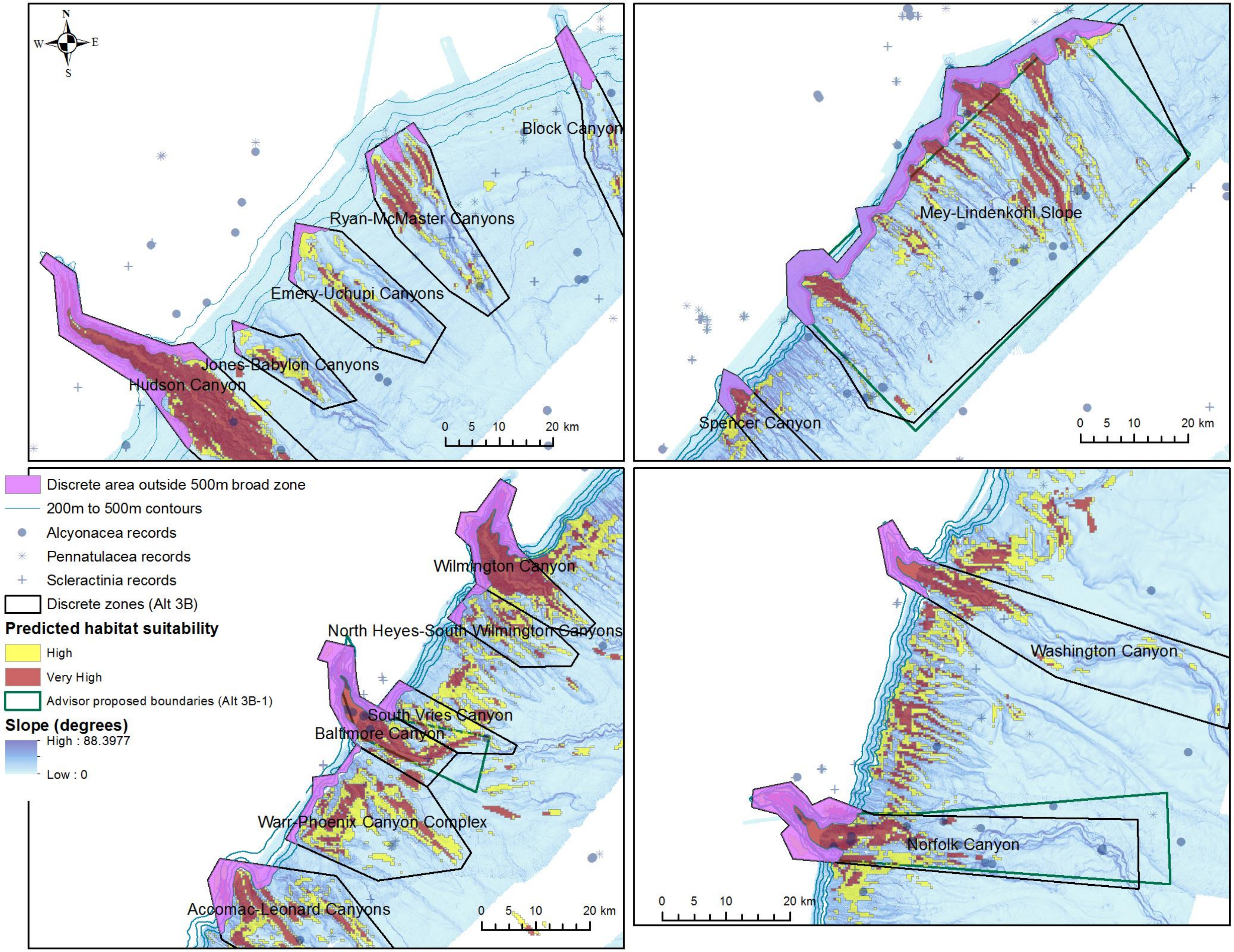

Figure 8: Proposed discrete area falling outside the 500 meter broad zone.

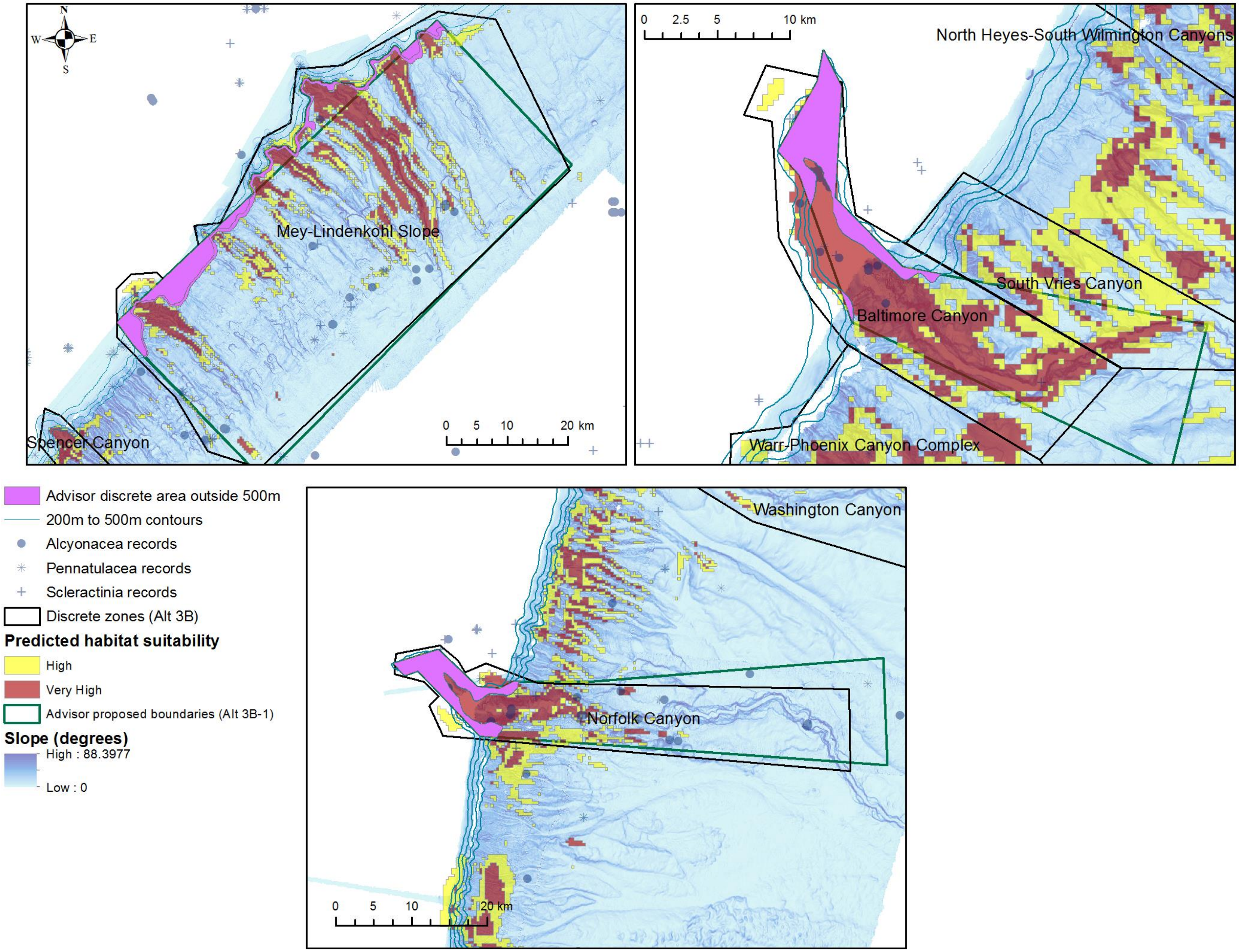

Figure 9: Advisor-proposed discrete areas falling outside the 500 meter broad zone.