

Appendix 2C

Comparison of Draft Fathom Floodplain Data in Region 14 (Memo)

Memorandum

TO: Jeff Irvin, AECOM

FROM: Paul Southard, Aqua Strategies

THROUGH: Barney Austin, Aqua Strategies

DATE: August 6th, 2021

RE: Comparison of Draft Fathom Floodplain with 1D-Derived Floodplain Maps used in TWDB Floodplain Quilt in Region 14, West Texas

This document details a comparison of floodplain maps produced by the Fathom pluvial and fluvial floodplain models at a 30m resolution and traditional 1D-derived floodplain mapping methods that are incorporated into the TWDB Flood Hazard Quilt¹ for TWDB flood mapping Region 14. Fathom results are compared to all four of the flood hazard maps available in the quilt, presented below in order of accuracy and subsequent prioritization in the TWDB flood quilt:

1. Preliminary recent National Flood Hazard Layer (NFHL) flood hazard zones
2. Effective NFHL flood hazard zones
3. Base Level Engineering (BLE) flood hazard maps.
4. First American Flood Data Services (FAFDS) flood hazard maps

In all cases, the comparison detailed here is of the 100-yr recurrence interval, 1% probability flood. Fathom fluvial defended and pluvial datasets are colored to show depth of flooding in cm, and any of the data sources from the TWDB Flood Hazard Quilt just show the areal extent of flooding. Note that Fathom pluvial and fluvial results are clipped for any depth less than 20 cm in an attempt to remove the many very small, disconnected, shallow areas of pluvial flooding in this dataset. Also, note that areas outside of the border of Texas, which can be seen somewhat in some of the figures, have invalid data and should not be considered in this comparison. Final Fathom datasets will be merged and combined with forthcoming coastal data to produce a final floodplain map. Final floodplain maps will also be converted to 3m resolution using downscaling techniques.

It is important to note that the Fathom model methodology in some cases differs from typical floodplain modeling that informs the NFHL and, subsequently, the FEMA Flood Insurance Rate Map (FIRM). For one thing, the Fathom model is a 2D model, and NFHL results are from 1D models. Fathom also uses high resolution topography data from LiDAR, which may only be implemented in some 1D modeling, or may be more recent than elevation datasets used in NFHL models. Additionally, Fathom may implement hydrologic structures that would affect flooding differently than NFHL models. It should be noted that levees in particular are implemented in the Fathom model by ensuring that water cannot enter service areas of levees for

¹ <https://twdb-flood-planning-resources-twdb.hub.arcgis.com/pages/flood-hazard-quilt>

simulations where the return period is lower than the design standard of the levee. Levees that are represented in this way are those that are available in the USACE National Levees Database (NLD).

NFHL Preliminary Data

Preliminary NFHL data represents future updates to the NFHL map that have been released for review, and subsequently details results of very recent flood studies. In Region 14, preliminary data is only available in the vicinity of El Paso.

The Fathom data details floodplains north (Figure 1a upper left) and east (Figure 1b lower left and upper center) of the city that are not present in preliminary NFHL data. Additionally, wide swaths of the city adjacent to the Rio Grande are mapped as floodplains in the preliminary data and not included in the Fathom data (Figure 1a lower left), as well as large areas to the south and east of the city (Figure 1c lower center and top left). The Fathom and preliminary NFHL floodplains are reasonably similar in many of the smaller tributaries in this region (Figure 1a center, Figure 1b upper left, Figure 1c lower left).

NFHL Effective Data

Effective NFHL data is effective in the current FEMA FIRM (FIRM) and is available in some locations from “Detailed” studies and in others from “Approximate” studies. These data are combined here for the purposes of comparison against Fathom results. These data are only available in the southeast corner of El Paso, in an area that is much smaller than for the preliminary NFHL data.

In areas where NFHL data from a detailed study is available, it is typically much more extensive and continuous than Fathom results (Figure 2a and Figure 2b). That being said, there are also locations where NFHL detailed study flood zones are confined in narrow areas and are in close agreement with Fathom floodplains (Figure 2a lower right). Fathom also identifies more widespread, small areas of flooding than NFHL data (Figure 2b). Fathom does not identify flooding in portions of the Rio Grande that are available from NFHL approximate studies (Figure 2b lower left and Figure 2c).

BLE Data

BLE data can be used as best available information in areas that are Zone A’s in the FIRM from approximate studies. For Region 14, BLE data is only available in the vicinity of El Paso, for the same area as the preliminary NFHL data. BLE data are quite similar to preliminary NFHL data, and the same areas are shown in Figure 3 as in Figure 1.

The Fathom data still details large, continuous floodplain running parallel to the Rio Grande (Figure 3a upper left) and north and east of El Paso (Figure 3b lower left and upper center) that are not present in the BLE data. Areas adjacent to the Rio Grande that are in the floodplain (Figure 3a lower left) are considerably less extensive and continuous than they were in the preliminary NFHL data. In these areas, the Fathom floodplain is still much narrower and less continuous, but it is closer than it was in the preliminary NFHL data. Large floodplain extents to the south and east of the city are also present in the BLE data that are considerably wider than Fathom floodplains (Figure 3b lower right and Figure 3c). The Fathom and BLE floodplains are reasonably similar in many of the smaller tributaries in this region (Figure 3a center, Figure 3b upper left, Figure 3c lower left), as they were for the preliminary NFHL data.

FAFDS Data

FAFDS flood hazard maps contain digitized flood hazard information from historical FIRMs and Flood Information Studies. For Region 14, FAFDS data are available throughout most of the planning region.

Several extensive floodplains in broad, flat basins located southwest of the Guadalupe mountains are detailed in FAFDS data for which Fathom floodplains are also present, but are considerably narrower (Figure 4a). The floodplains for the two datasets in drainage networks upslope of these basins are quite similar, but Fathom floodplains usually extend further upstream (Figure 4a lower left). In areas of Amistad's upland watershed with well-defined drainage networks, the floodplains for the two datasets are quite similar, with the Fathom floodplain being just slightly narrower (Figure 4b). Closer to Amistad, the FAFDS floodplain is considerably wider than the Fathom floodplain, but the Fathom floodplain extends farther upstream (Figure 4c).



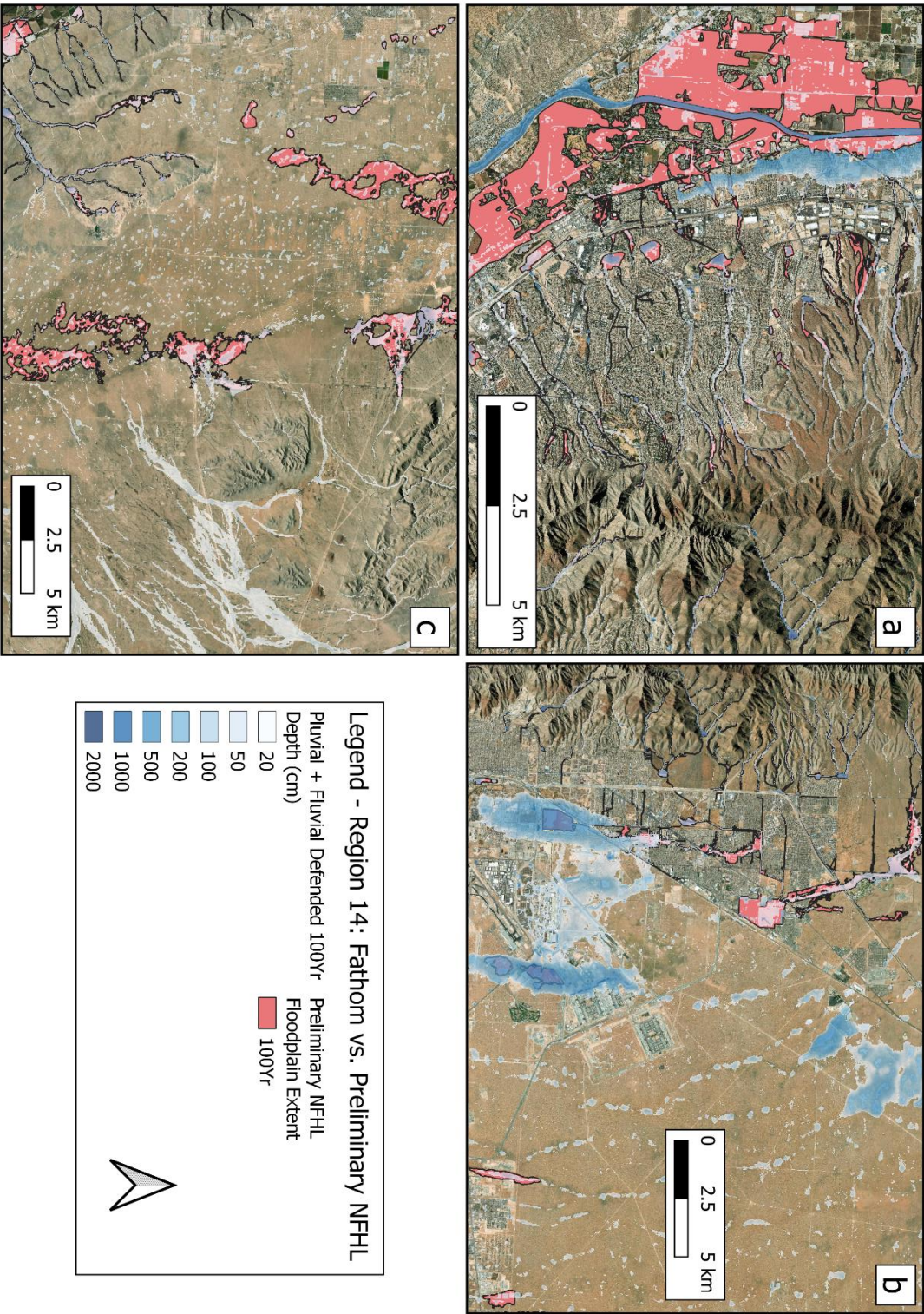


Figure 1: Comparison of Fathom floodplain with preliminary NFHL data just northwest of El Paso (a), just northeast of El Paso (b) and east of Horizon City (c).

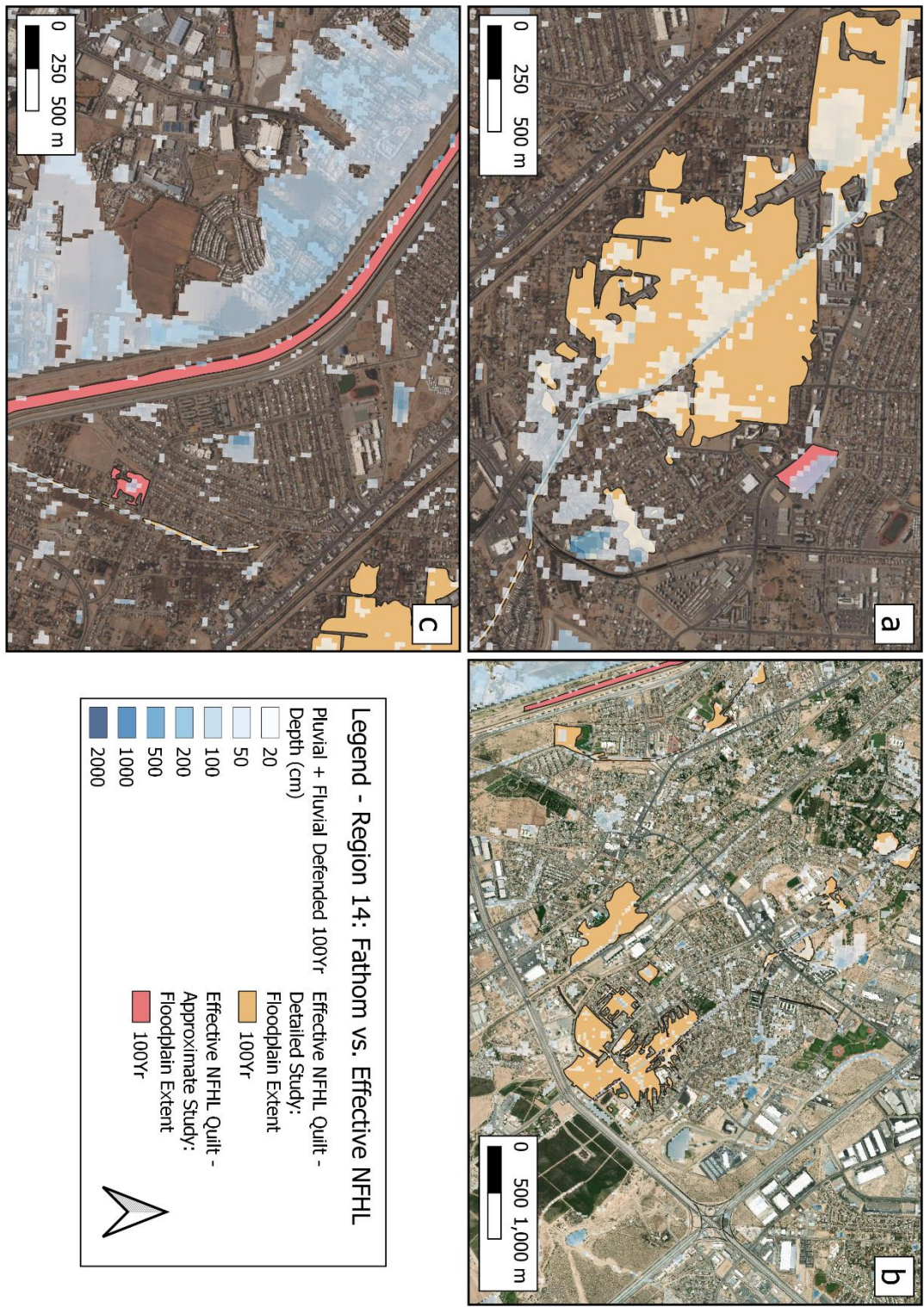


Figure 2: Comparison of Fathom floodplain with effective NFHL data just southeast of El Paso (a, b, c).

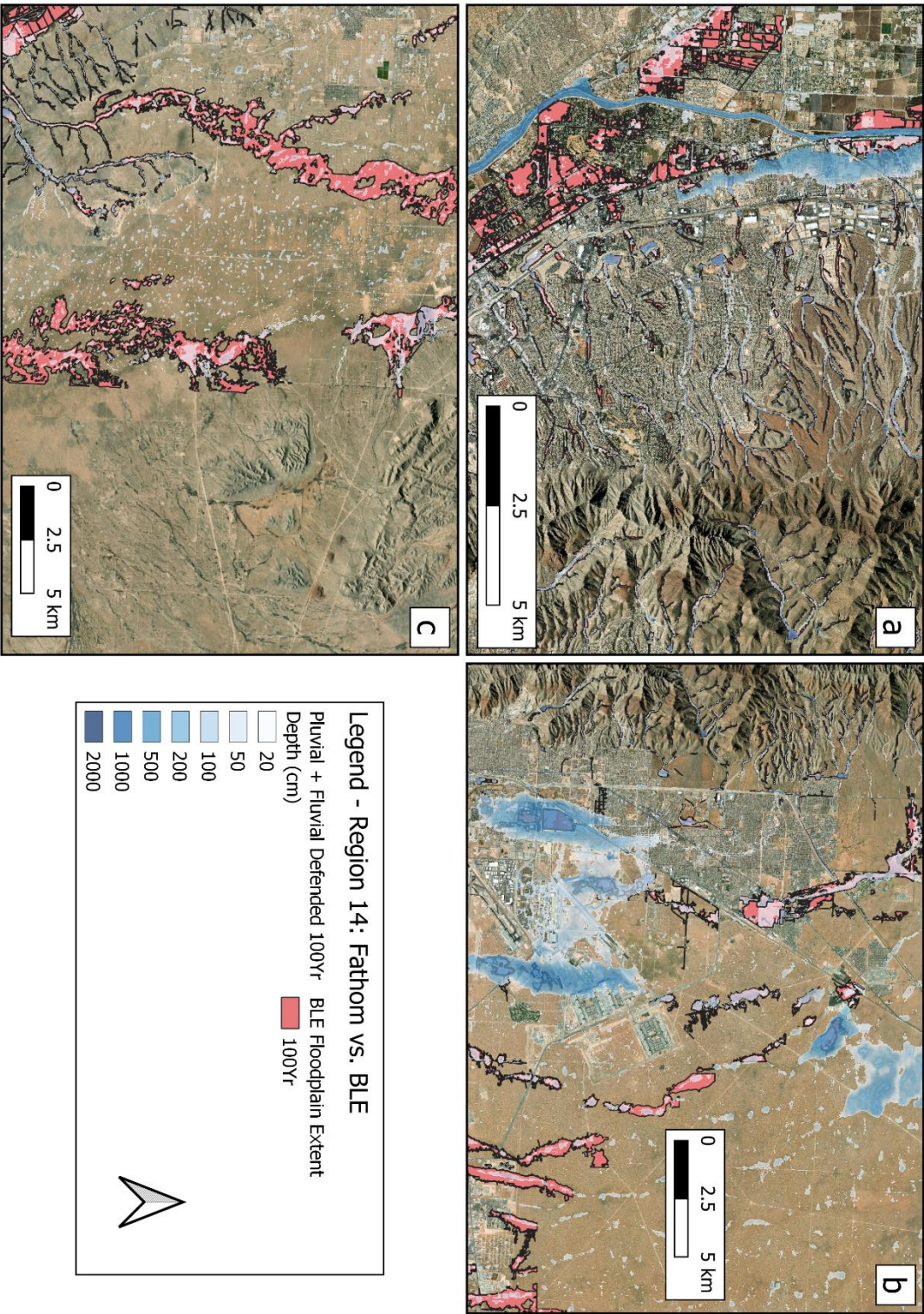


Figure 3: Comparison of Fathom floodplain with BLE data just northwest of El Paso (a), just northeast of El Paso (b) and east of Horizon City (c).

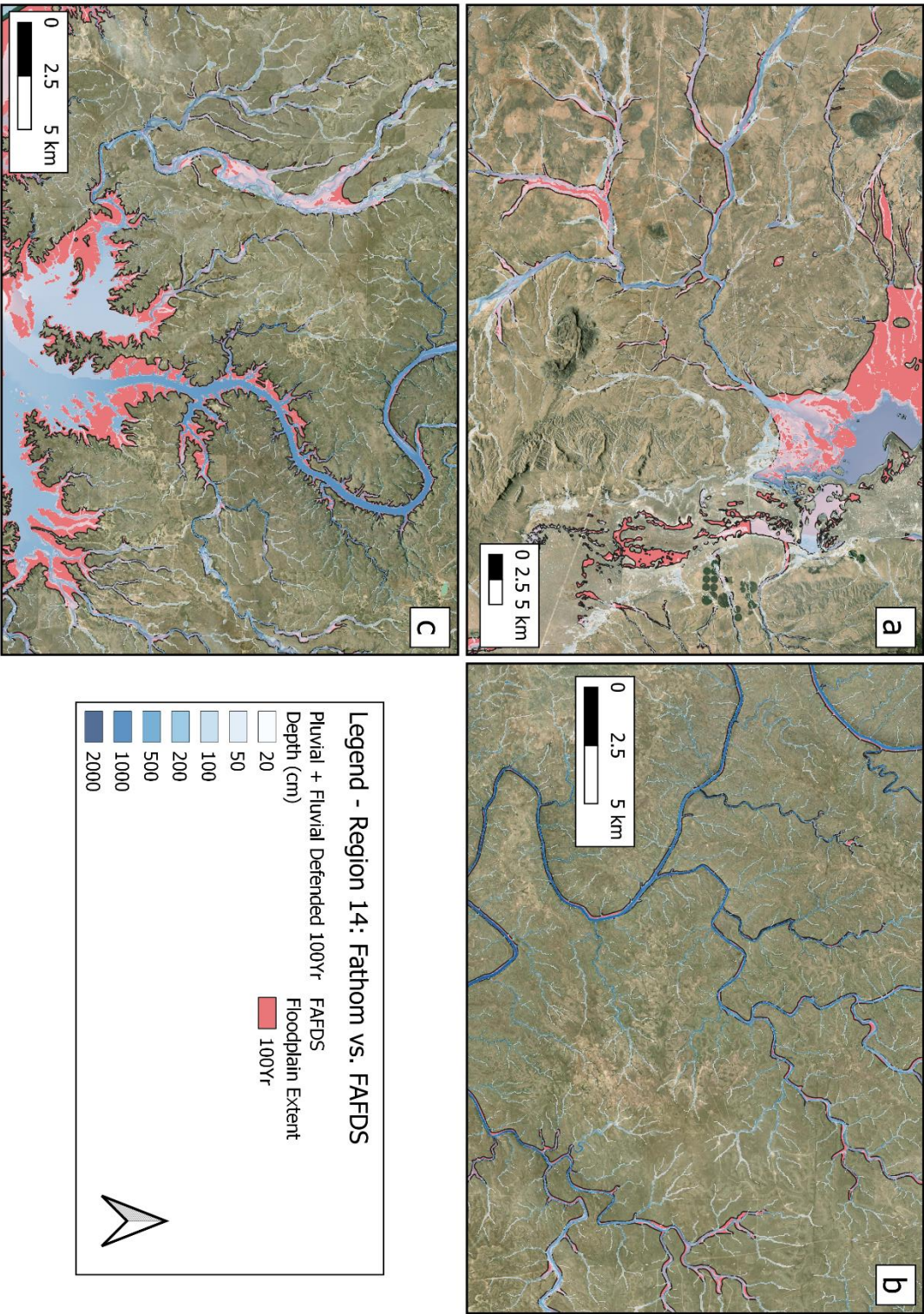


Figure 4: Comparison of Fathom floodplain with FAFDS data south of Dell City (a), northwest of Comstock (b) and at Lake Amistad (c).