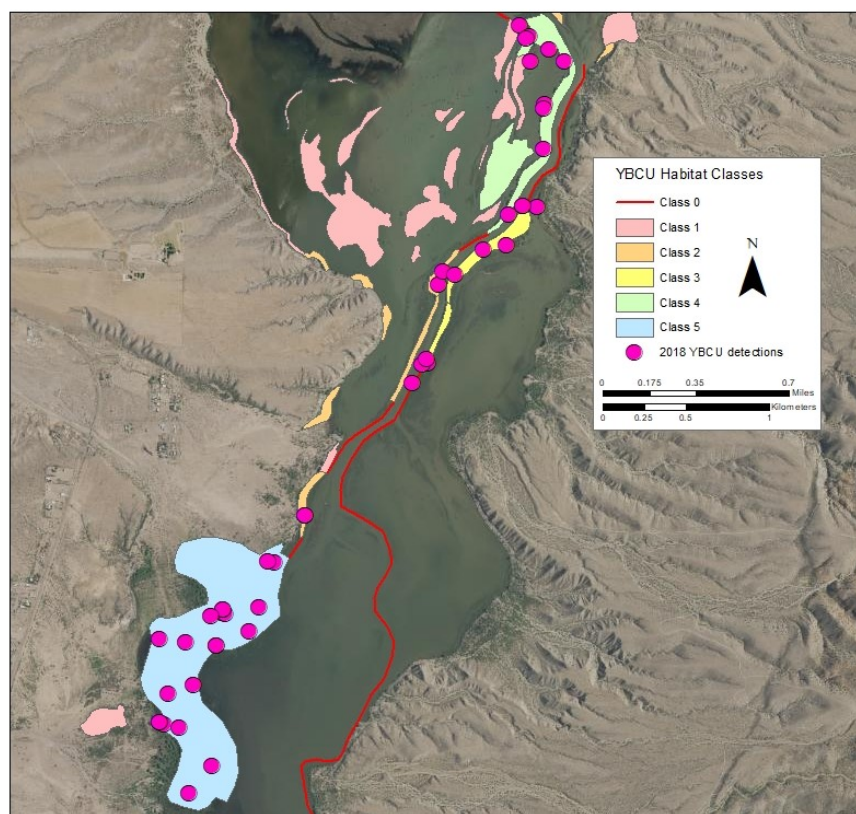


RECLAMATION

Managing Water in the West

Western Yellow-billed Cuckoo Habitat Classification 2018

Lower Rio Grande from Elephant Butte Dam, NM to El Paso, TX



U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Fisheries and Wildlife Resources
Denver, Colorado

April 2019

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Western Yellow-billed Cuckoo Habitat Classification 2018

**Lower Rio Grande from Elephant Butte Dam, NM to El Paso,
TX**

Report No. ENV-2019-042

prepared for

**Bureau of Reclamation
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque, NM 87102**

by

**Bureau of Reclamation
Technical Service Center
Fisheries and Wildlife Resources Group
Dave Moore, Wildlife Biologist
Rebecca Siegle, Natural Resources Specialist
Denver, CO**

With funding from

**Bureau of Reclamation
Policy and Administration
Environmental Compliance Division
Lakewood, CO 80227**



**U.S. Department of the Interior
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Technical Service Center
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Executive Summary

During the spring of 2018, Bureau of Reclamation personnel classified the suitability of floodplain habitat for breeding Yellow-billed Cuckoos within the Lower Rio Grande (LRG) between Elephant Butte Dam, New Mexico and El Paso, Texas. Seven different study reaches were delineated based on geographic landmarks, habitat characteristics and ongoing surveys for both the federally threatened Yellow-billed Cuckoo and the endangered Southwestern Willow Flycatcher. All ground within the active floodplain (i.e. not separated from the river channel by roads, levees, etc.) was visually classified based on its suitability as habitat. Classification was performed either via kayak or on foot by biologists with expert knowledge of the habitat requirements of the species. Habitat classes ranged from zero (non-habitat) to five (highly suitable) and took into consideration vegetation height, patch width and overall patch size; classes 2 and below were considered unsuitable and classes 3 and above were considered at least marginally suitable.

Within the study area's 216 kilometers of riparian corridor, approximately 45 percent of the linear distance of riverbank was classified as zero, or nonhabitat. Overall, approximately 220 hectares of suitable habitat were mapped within the study area. The Caballo reach had both the highest percentage of non-habitat (84 percent, which can be attributed to ongoing and historical land use and management activities in the upstream portion) and the majority of suitable YBCU breeding habitat (160 acres, which were located within the Caballo Reservoir delta). Not surprisingly, the Caballo reach also contained most of the cuckoo detections and territories in the LRG during 2018 surveys. Although there were increases in YBCU detections and slight increases in suitable habitat compared to the previous mapping effort in 2016, habitat data generated during 2018 documented an absence of suitable cuckoo habitat within most of the LRG due to river and floodplain management and resulting floodplain characteristics.

Introduction

The Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*), hereafter referred to as YBCU or cuckoo, is a neotropical migratory bird that has experienced severe population declines due primarily to habitat loss and degradation. It is considered a threatened Distinct Population Segment (DPS) under the Endangered Species Act (USFWS 2014b). In the Southwestern United States, the YBCU nests in large, dense patches of riparian vegetation, particularly with a cottonwood (*Populus deltoides*)/tree willow (*Salix gooddingii*) overstory (Ehrlich et al. 1988, Hughes 1999, USFWS 2014a). A dense understory, comprised of exotic saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*) or native vegetation (e.g. *Salix* spp.) also appears to be an important component for territory establishment (Sechrist et al. 2009). Saltcedar may be a component of cuckoo habitat, however as the proportion of saltcedar increases, the overall habitat suitability for cuckoos is believed to decrease, and saltcedar monocultures are unsuitable habitat (USFWS 2014a). Territories range in size from 4 to 40 hectares (ha), are usually in close proximity to water, and are not defended from conspecifics (Halterman 2001, Sechrist et al. 2013). A radio telemetry study conducted in the Middle Rio Grande found that home range estimates for YBCUs varied from 5 to 282 ha and averaged 82 ha based on the minimum convex polygon method (Sechrist et al. 2009). A YBCU habitat model developed for the Middle Rio Grande incorporating data from over 2000 detections and over 600 territories found that the species occurred in patches of native overstory ranging in size from 2 to 818 ha (averaging 78 ha), all of which were greater than 20 meters (m) wide (Siegle et al 2018). The U.S. Fish and Wildlife Service (USFW; 2014) states that cuckoos rarely nest in patches less than 20 ha, and patches less than 15 ha are unsuitable as breeding habitat, with an optimal size of around 80 ha. Although this may be the case on a range-wide basis, it does not appear to be the case within the Lower Rio Grande (LRG) where cuckoos regularly occupy and likely nest in isolated patches as small as 2 ha in size and 35 m in width, as long as the vegetation provides sufficient structure and density.

The Rio Grande is considered one of the important strongholds for the YBCU, and historically they were “relatively common” along sections of the river (Howe 1986). In particular, large numbers of cuckoos are detected during annual presence/absence surveys in the delta of Elephant Butte Reservoir and this is an important breeding and source population for the species. However, during the past 80 years, the range-wide population of YBCUs has declined dramatically due to habitat loss and modification as well as a reduction of food resources due to pesticides (Gaines and Laymon 1984, USFWS 2014a).

Currently, woody riparian habitat within much of the LRG is either absent, composed of narrow stringers immediately adjacent to the river, or dominated by non-native saltcedar due to historical river management activities. The highest quality cuckoo habitat occurs where riparian vegetation has been allowed to grow within unconstrained floodplains above a shallow water table and/or flooded conditions. A cuckoo habitat mapping effort within the LRG was initiated in 2016 (Moore and Ahlers 2017) and mapping was conducted again in 2018; the 2018 effort is detailed in the following sections. These maps are intended for general informational and planning purposes and are not intended to substitute for site visits during project impact assessment.

Methods

Study Area

During the 2018 study, riparian habitat classification was conducted within the LRG from Elephant Butte Dam in New Mexico to the international boundary (River Mile 0) adjacent to El Paso, Texas (Figure 1). This stretch of river is highly managed and regulated by flow releases from Elephant Butte and Caballo Dams. The river channel is typically dry in the winter and carries water during the irrigation season (generally May to September). If water is available, releases are sufficient to provide irrigation water but rarely reach magnitudes that lead to inundation of the surrounding floodplain. Thus, much of the floodplain within this stretch of river is more xeric than upstream reaches and typically dominated by exotic saltcedar or upland species.

Habitat Classification

Vegetation within the active floodplain of the Rio Grande (i.e. not separated hydrologically from the active river channel by a major impediment such as a road or levee) was assessed on the potential for providing YBCU breeding habitat and was classified based on an alphanumeric system that incorporates vegetation height, patch size and width, and woody species composition. Cuckoo habitat preferences were based on survey detection locations within the LRG during 2014 and 2015 (Carstensen et al. 2014, and Moore and Ahlers 2015) and data presented in the Western Yellow-billed Cuckoo Survey Protocol (Halterman et al. 2015). As such, minimum requirements for cuckoo breeding habitat within the LRG were determined to be

- 1) woody riparian vegetation taller than 5 m,
- 2) patch width greater than 35 m,
- 3) at least 75% canopy closure,
- 4) patch size at least 2 ha, and
- 5) dominated by either native cottonwood/willow or mixed community containing less than 50 percent saltcedar.

Habitat was considered native-dominated if native willows and/or cottonwoods comprised at least 75 percent of the woody vegetation. The classification expanded on these criteria in order to distinguish the various levels of suitability (e.g. marginally to highly suitable) and represent which criteria are lacking within habitat that was deemed unsuitable for breeding cuckoos. For management purposes, any habitat classified as a 3 or higher met the minimum habitat requirements and should be considered suitable. The following is a breakdown of the cuckoo habitat classes used during the 2018 habitat classification:

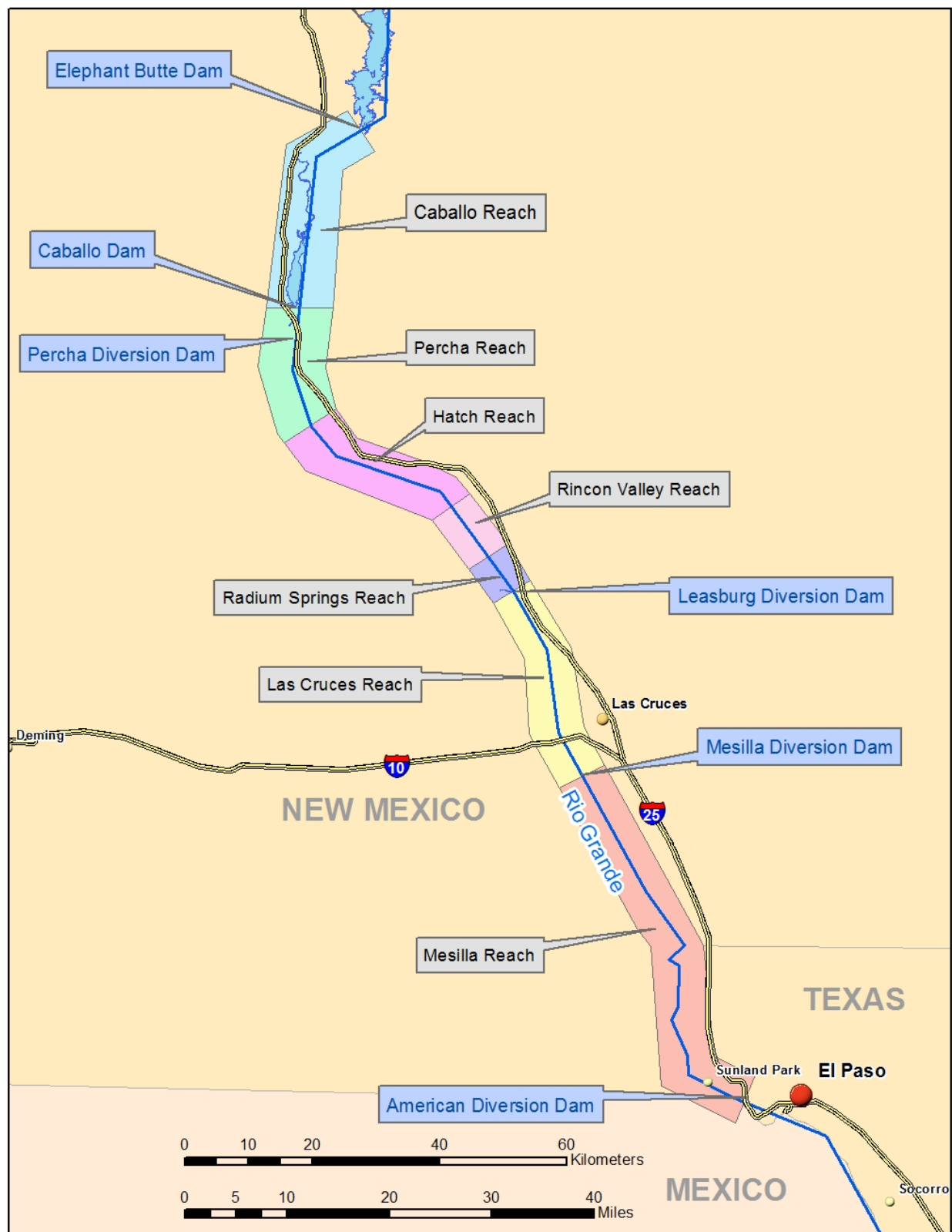


Figure 1. 2018 Lower Rio Grande YBCU habitat classification study area.

Class 0 (Non-habitat) - Riparian vegetation is absent, very sparse, or generally less than 2 m in height (i.e. bare ground, herbaceous vegetation, scoured river bars or islands). Generally consists of barren or mowed portions of the active floodplain.

Class 1 (Unsuitable) - Riparian vegetation lacks height and/or patch width - height less than 5 m and/or patch width less than 20 m. Species composition is irrelevant (i.e. patch width, height, and species composition may all be limiting factors). Generally consists of narrow bands of coyote willow habitat within the channel prism.

Class 2 (Unsuitable) - Riparian vegetation width, patch size, and/or species composition may be limiting factors. Class 2 is further subdivided in order to illustrate limiting factors to habitat suitability:

Class 2a - Vegetation height less than 5 m and patch width 20 to 35 m, or

Class 2b - Vegetation height greater than 5 m and width greater than 35 m, but patch size less than 2 ha, or

Class 2c - Vegetation structure/density and patch size criteria are met, but patch dominated by saltcedar. Generally defined as older, drier patches of saltcedar sometimes mixed with mesquite and typically not subject to overbank flooding.

Class 3 (Marginally suitable) - Vegetation height greater than 5 m and patch width 35 to 50 m, with patch size 2 to 5 ha, and canopy dominated by cottonwood/willow or mixed native and exotic vegetation (i.e. patch size/width and vegetation height are moderately sufficient; patch dominated by overstory cottonwood/willow).

Class 4 (Suitable) - Vegetation height greater than 5 m and patch width 50 to 100 m, with patch size 5 to 20 ha (i.e. all necessary habitat characteristics are present and patch dominated by overstory cottonwood/willows or mixed native and exotic vegetation).

Class 5 (Highly suitable) - Structurally diverse vegetation, height 5 to 15 m, patch width greater than 100 m, patch size greater than 20 ha, and native dominated overstory with dense understory (i.e. ideal habitat characteristics are present - large patch size, high degree of mature native vegetation up to or exceeding 15 m in height, relatively high water table).

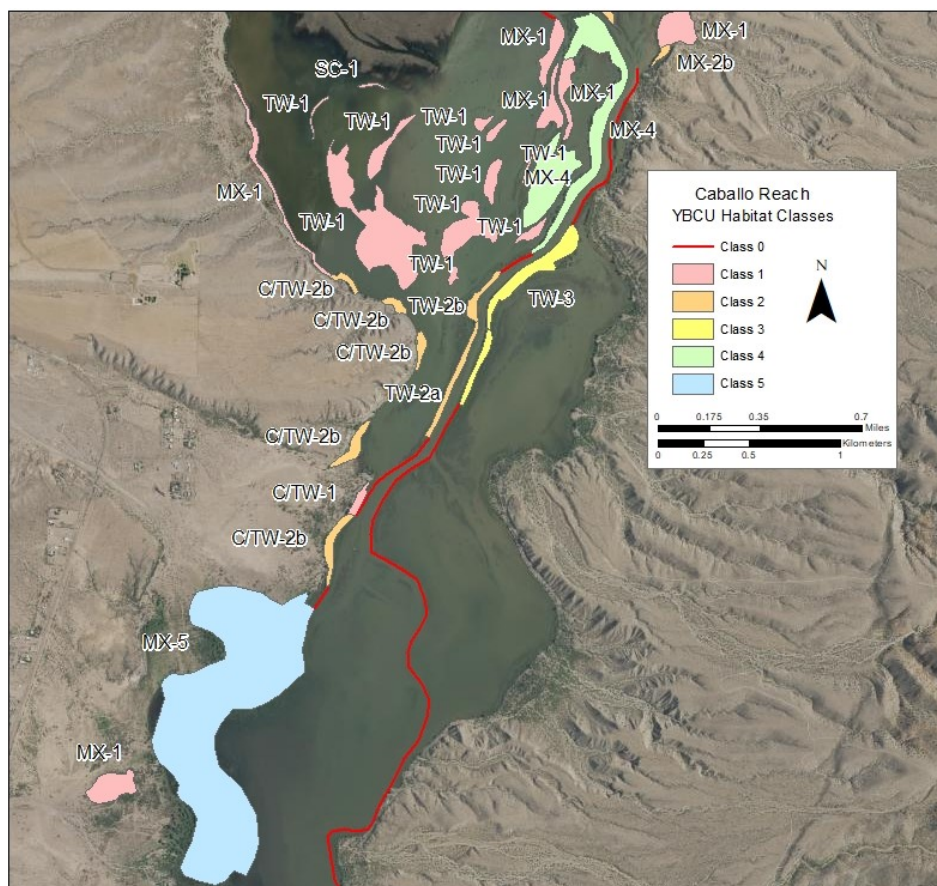
Habitat classifications 1 – 5 also included a species designation denoting the dominant woody vegetation. A species was considered dominant if it composed more than 90 percent of the woody vegetation within a given habitat class (i.e. CW-3 denotes a coyote willow dominant Class 3). If no species constituted greater than 90 percent of the woody vegetation, a mixed (MX) designation was given (i.e. MX-3). Lastly, in habitat comprised of at least 75 percent native species, if multiple native species were dominant, a co-dominant designation was given (e.g. C/TW-4 designates a cottonwood and tree willow Class 4). Species that were included in habitat classification types are listed in Table 1.

When classifying habitats in the field, the extent of the active floodplain on both sides of the river and any islands were assessed visually and accessed either via vehicle, kayak or on foot. Habitat polygons of Class 1 or above were delineated on 2016 aerial photography encompassing the entire study area. Where public access was granted, large, complex habitat polygons were entered on foot in order to fully assess habitat characteristics. Any habitat within the active

Table 1. Plant species included in habitat classification types.

Common name	Scientific name	Code
Velvet ash	<i>Fraxinus velutina</i>	A
Rio Grande cottonwood	<i>Populus deltoides</i>	C
Coyote willow	<i>Salix exigua</i>	CW
Russian olive	<i>Eleagnus angustifolia</i>	RO
Saltcedar	<i>Tamarix ramosissima</i>	SC
Tree willow	<i>Salix gooddingii</i>	TW

floodplain not assigned a Class 1 or above was considered a zero, or non-habitat. Data recorded on aerial photos in the field were subsequently double-checked for accuracy in the office and digitized into Geographic Information Systems (GIS) files overlain on the 2016 aerial photos. The size of all polygons (in hectares) was calculated and summed by reach and structure class. Non-habitat was mapped as linear distance (in kilometers) along each bank not occupied by a habitat polygon and tallied by reach. Figure 2 provides an example of maps produced using this classification system.

**Figure 2.** Example of YBCU habitat classification system used in Lower Rio Grande 2018.

Note: The classifications of these habitats are intended for general planning purposes and are not intended to substitute for site-specific project-related assessments. The primary objectives of this study were to generally assess habitat quality and quantify the extent of suitable breeding habitat for the YBCU within this stretch of the LRG Basin.

Results

In total, 215.8 kilometers (km) of the LRG was classified during 2018. Of this, 44.9 percent of the linear distance of the active floodplain was devoid of significant woody vegetation and classified as Class 0. The Caballo and Mesilla reaches (Figure 1) contained the highest percentages of Class 0; 83.6 and 41.9 percent of the linear distance of the active floodplain, respectively (Table 2). Of the non-zero habitat classes, Class 1 was the most abundant throughout the study area covering 316.3 ha (Table 3). The sum of the three Class 2 types totaled approximately 220.9 ha, most of which was monotypic saltcedar (Class 2c). Class 3 was the least represented of the habitat classes within the LRG (46.3 ha) and Classes 4 and 5 totaled 102.6 ha and 71.1 ha, respectively. A total of 220 ha of suitable YBCU habitat was mapped within the LRG, the majority of which was located in the Caballo Reach. Rincon Valley, Mesilla, and Las Cruces reaches had no habitat classified as suitable for YBCU breeding.

Table 2. Extent of Class 0 (non-habitat) within the active floodplain of Lower Rio Grande study reaches.

Reach	Reach length (km)	Both Banks length (km)	Total linear length of Class 0 (km)	Percentage of Class 0
Caballo	42.6	85.2	71.2	83.6
Percha	24	48	18.9	39.4
Hatch	29.6	59.2	15.1	25.5
Rincon Valley	11.3	22.6	6.8	30.1
Radium Springs	8.4	16.8	3.4	20.2
Las Cruces	31.7	63.4	21.3	33.6
Mesilla	68.2	136.4	57.2	41.9
Total	215.8	431.6	193.9	44.9

Note: Percentage of Class 0 calculated by dividing the total length of 0's by the doubled reach length, accounting for both banks.

Table 3. Hectares of YBCU habitat within the active floodplain of Lower Rio Grande study reaches.

Reach	Class 1 (Unsuitable)	Class 2a (Unsuitable)	Class 2b (Unsuitable)	Class 2c (Unsuitable)	Class 3 (Moderately Suitable)	Class 4 (Suitable)	Class 5 (Highly Suitable)
Caballo	108.0	5.4	17.9	11.0	8.0	80.4	71.1
Percha	31.5	2.5	8.2	16.2	20.9	13.5	0.0
Hatch	46.4	8.4	25.9	0.0	11.4	8.7	0.0
Rincon Valley	15.7	1.8	4.9	7.1	0.0	0.0	0.0
Radium Springs	4.3	1.9	19.4	15.6	6.0	0.0	0.0
Las Cruces	34.7	2.4	8.3	53.9	0.0	0.0	0.0
Mesilla	75.7	5.0	5.2	0.0	0.0	0.0	0.0
Total	316.3	27.3	89.7	103.9	46.3	102.6	71.1

The percentage of total habitat that was determined to be suitable for YBCU breeding within each reach is listed in Table 4. The reaches with the highest proportions of suitable habitat were Caballo and Percha. Out of 757 ha of total habitat, 220 ha were classified as suitable (sum of Classes 3, 4, and 5); suitable YBCU habitat accounted for 29 percent of the woody riparian vegetation along the entire LRG.

Table 4. Percentage of suitable YBCU habitat (ha) by reach.

Reach	Suitable Habitat – Classes 3,4,5 (ha)	Total Habitat (ha)	Percent Suitable Habitat
Caballo	159.5	301.7	52.9%
Percha	34.4	92.7	37.1%
Hatch	20.1	100.8	19.9%
Rincon Valley	0.0	29.6	0.0%
Radium Springs	6.0	47.3	12.7%
Las Cruces	0.0	99.4	0.0%
Mesilla	0.0	85.9	0.0%
Total LRG	220.0	757.4	29.0%

Detailed maps of the habitat classification are included as an Attachment to this report and the following is a summary of habitat documented within each study reach.

The **Caballo Reach** (43 km) was the second longest reach in the study area and contained the highest degree of habitat diversity. This reach consisted of two sections: (1) upstream of Caballo Reservoir between Elephant Butte Dam and the Caballo Reservoir pool and (2) the conservation pool of Caballo Reservoir. Floodplain habitat within these two sections was markedly different. The floodplain within the Caballo Reach upstream of Caballo Reservoir was constricted by human development and consisted primarily of bare riverbank or narrow stringers of woody vegetation. The floodplain was perched above a river heavily regulated by releases from Elephant Butte Dam, so the water table was relatively deep and overbank flooding nearly nonexistent. Thus, woody vegetation was dominated by non-native saltcedar or short stature coyote willow on lower river banks. Within the Caballo Reservoir pool, the active floodplain was less constrained and was up to three km wide. River flows were regulated by Elephant Butte Dam releases, but a less incised river channel, rising and falling reservoir levels, and occasional localized inflows from the adjacent uplands provided for a shallower water table and occasional flooded conditions. These conditions promoted the growth of native vegetation in many areas and large patches of suitable YBCU breeding habitat developed. Overall, 84 percent of the linear length of this reach was classified as non-habitat (Table 2). Most of this occurred in the upper end of the reach or along unvegetated banks of Caballo Reservoir. Conversely, the Caballo Reach also contained 72.5 percent of the suitable YBCU habitat mapped within the study area; a total of 159.5 ha of Class 3 or greater habitat was mapped in 2018 (Table 3).

The **Percha Reach** (24 km), lying immediately downstream of Caballo Dam, was largely characterized by an elevated floodplain that was relatively disconnected from the river channel due to flow regulation and a lower groundwater table. A relatively large percentage (39.4) of the

linear distance of the floodplain within the reach was devoid of significant woody vegetation and classified as non-habitat (Table 2). Due to the hydrological characteristics of the reach, the majority of the non-zero habitat occurred in the form of narrow bands of vegetation along the riverbank (Class 1) or larger dry patches of saltcedar farther from the river channel (Class 2c). Several patches of suitable habitat occur near Percha Dam where flows were slowed and a higher water table existed. A total of 34.4 ha of Class 3 and 4 suitable YBCU habitat was mapped during 2018 (Table 3).

The **Hatch Reach** (29.6 km), due to a highly managed and constrained floodplain and regulated river flows, contained a limited amount of suitable YBCU habitat. Non-habitat was classified in 25.5 percent of the linear length of this reach (Table 2). Of habitat classified, 6.7 ha of Class 3 and 8.7 ha of Class 4 were mapped (Table 3). This suitable habitat was located in the downstream end of the reach in four different patches and consisted of either mature coyote willow or a mixture of coyote willow and saltcedar on river bars, islands or lower terraces.

Similar to the Percha Reach, the **Rincon Valley Reach** (11.3 km) was dominated by a perched floodplain that was disconnected from the active river channel. Woody riparian vegetation, when present – 30.1 percent of the reach was classified as non-habitat – consisted almost entirely of narrow bands along the riverbanks (Class 1) or larger patches of dry, decadent saltcedar (Class 2c). No suitable YBCU habitat was mapped within this reach in 2018 (Table 2).

The **Radium Springs Reach** (8.4 km) was immediately upstream of Leasburg Dam. Floodplain habitat in this reach was less constrained by anthropomorphic activities and had a higher degree of connectivity to the river channel, resulting in YBCU habitat of relatively high quality. Suitable habitat existed in one large patch and consisted of a mix of native willows and saltcedar; a total of 6.0 ha of Class 3 were mapped in this reach in 2018 (Table 3).

The **Las Cruces Reach** (31.7 km) was a relatively long reach that extended from Leasburg Dam to Mesilla Dam and includes the city of Las Cruces. Riparian habitat within this reach was very limited due to hydrological conditions (i.e. regulated flows, perched floodplain) and floodplain management activities. The active floodplain was tightly restricted in many areas by levees, and periodic mowing of the riparian area reduced woody vegetation growth along most of the length of this reach. Nearly 34 percent of the linear distance of the floodplain in this reach was devoid of significant woody riparian vegetation and was classified as non-habitat (Table 2). No suitable YBCU habitat was mapped in this reach in 2018 (Table 3).

The **Mesilla Reach** (68.2 km) was immediately downstream of the Las Cruces Reach and was by far the longest of the seven study reaches. It was very similar to the Las Cruces Reach in terms of river and floodplain management and habitat characteristics. Approximately 42 percent of the linear distance of the floodplain was devoid of significant woody riparian vegetation and was classified as Class 0 (Table 2). The majority of habitat documented in this reach consisted of narrow, linear bands of riparian vegetation along the river banks, which classified as Class 1. No suitable cuckoo habitat was mapped in this reach in 2018 (Table 3).

Discussion

The total amount of suitable YBCU habitat within the study area increased by 5 percent from 2016 to 2018 (Table 5). Increases in suitable habitat were documented within the Hatch, Caballo, and Percha reaches while YBCU habitat decreased in the Radium Springs reach (Table 5 and Figure 3). No suitable habitat was identified within the Rincon Valley, Las Cruces, and Mesilla reaches in either year.

Table 5. Hectares of suitable YBCU habitat in the Lower Rio Grande – 2016 vs. 2018.

Reach	2016 Suitable Habitat	2018 Suitable Habitat	Difference in ha	Percent Gain or Loss since 2016*
Caballo	150.6	159.5	8.9	6%
Percha	34.1	34.4	0.3	1%
Hatch	15.4	20.1	4.7	31%
Rincon Valley	0	0	0	0%
Radium Springs	8.5	6.0	-2.5	-29%
Las Cruces	0	0	0	0%
Mesilla	0	0	0	0%
Total	208.6	220.0	11.4	5%

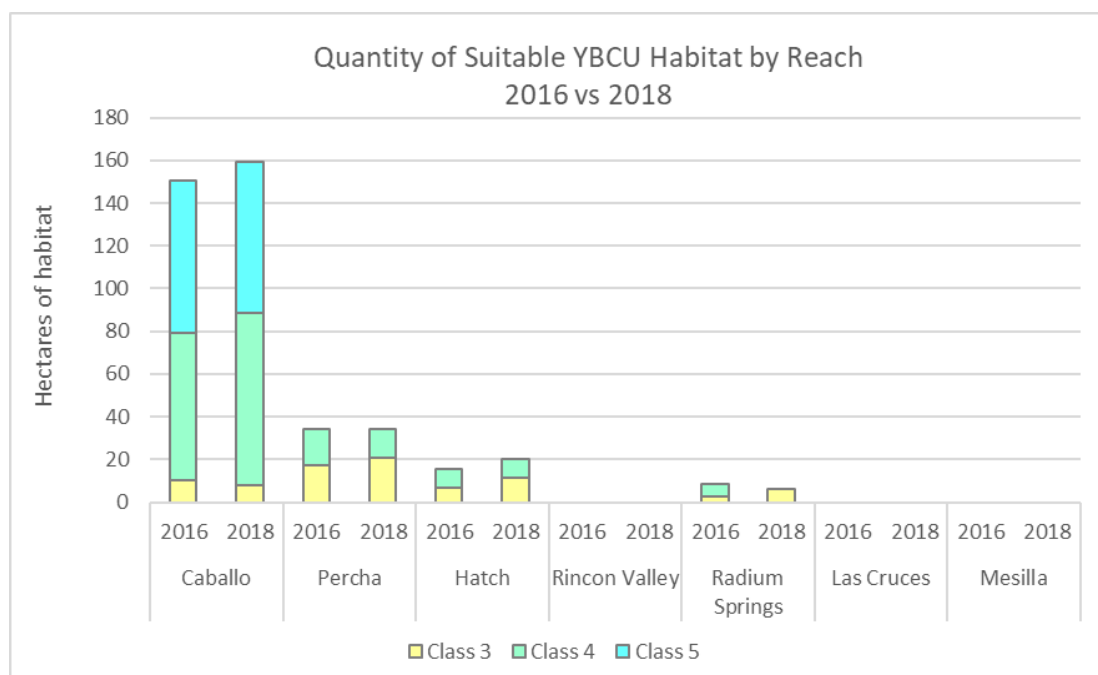


Figure 3. Quantity of suitable YBCU habitat mapped within the Lower Rio Grande by class and reach during the 2016 and 2018 mapping efforts.

Reclamation personnel began conducting YBCU surveys within selected LRG survey sites in 2012 after recording incidental cuckoo detections during Willow Flycatcher (*Empidonax traillii*) surveys. Cuckoo surveys were expanded in 2014 to include all potentially suitable habitat within the LRG. The number of YBCU detections and territories documented in 2018 are listed by reach in Table 6, which also includes the number of hectares of suitable habitat for comparison purposes. Cuckoos were detected within all reaches and the highest numbers were found in the Caballo and Radium Springs reaches. Between 2014 and 2018, cuckoo survey detections increased from 36 to 136 and delineated territories increased from 10 to 32. A YBCU nest was located within the Percha reach in 2017 and within the Caballo Reach in 2018.

Table 6. YBCU detections and territories documented in 2018 by reach along the Lower Rio Grande.

Reach	Number YBCU detections	Number YBCU territories	Hectares of Suitable Habitat
Caballo	58	13	159.5
Percha	7	1	34.4
Hatch	17	3	20.1
Rincon Valley	10	3	0.0
Radium Springs	25	7	6.0
Las Cruces	10	3	0.0
Mesilla	9	2	0.0
Total	136	32	220.0

Despite increases in the numbers of cuckoos detected as well as slight increases in the amount of suitable YBCU habitat mapped, breeding habitat for the YBCU in the LRG was still in relatively short supply as of 2018. Data suggested that YBCU will select less than ideal habitat for breeding, with criteria for “ideal” habitat based on other studies (Halterman et al. 2015, Johnson et al. 2017, Sechrist et al. 2013, Siegle et al. 2018). Nest success rates are difficult to determine for this species and therefore the influence of habitat on breeding success in the LRG is unknown.

Habitat mapping located a total of 220 ha of suitable cuckoo habitat which averages out to approximately 1 ha of YBCU habitat per km (or 29 percent of all habitat) for the entire length of the LRG. The majority of this habitat was located within the upstream half of the LRG, while the lower 100 km of river was entirely devoid of suitable cuckoo habitat. The lack of suitable YBCU breeding habitat can be attributed to river geomorphology, flow regimes and floodplain management in the LRG.

Conclusions

The cuckoo habitat classification conducted in 2018 documented 220 ha of suitable YBCU habitat within the LRG. This was an increase from 209 ha of suitable habitat in 2016, with slight increases in the Percha and Caballo Reaches (1 and 6 percent, respectively) and a 31 percent increase in the Hatch Reach. There was, however, a 29 percent decrease in suitable habitat in the Radium Springs Reach. Habitat suitability was confirmed by the presence of resident and, presumably, breeding cuckoos. However, most reaches within the LRG had vegetative conditions that were classified as unsuitable YBCU breeding habitat due to historical management activities. In the absence of management changes, it is unlikely that a substantial cuckoo population would develop in the near future.

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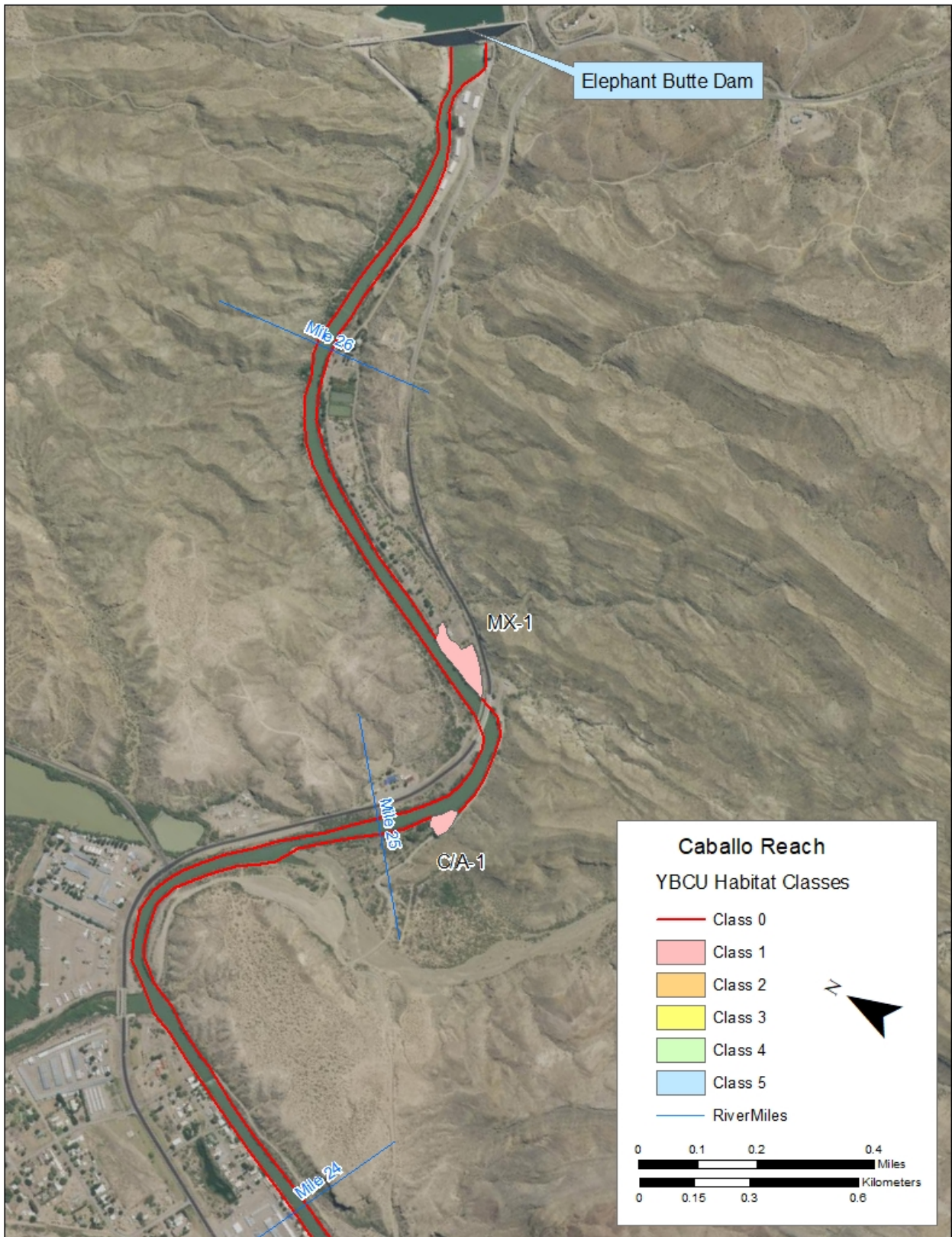
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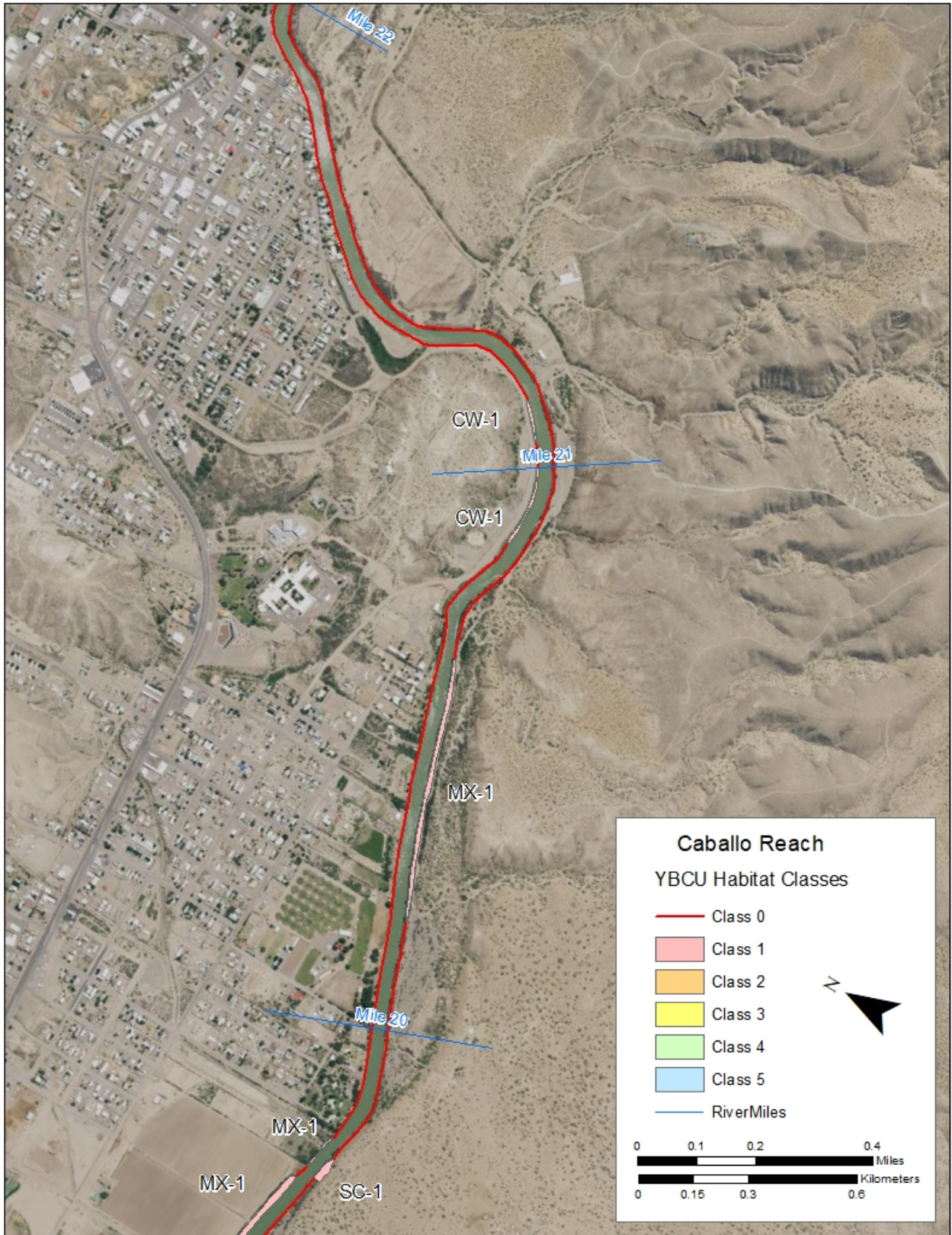
Attachment – Habitat Classification Maps

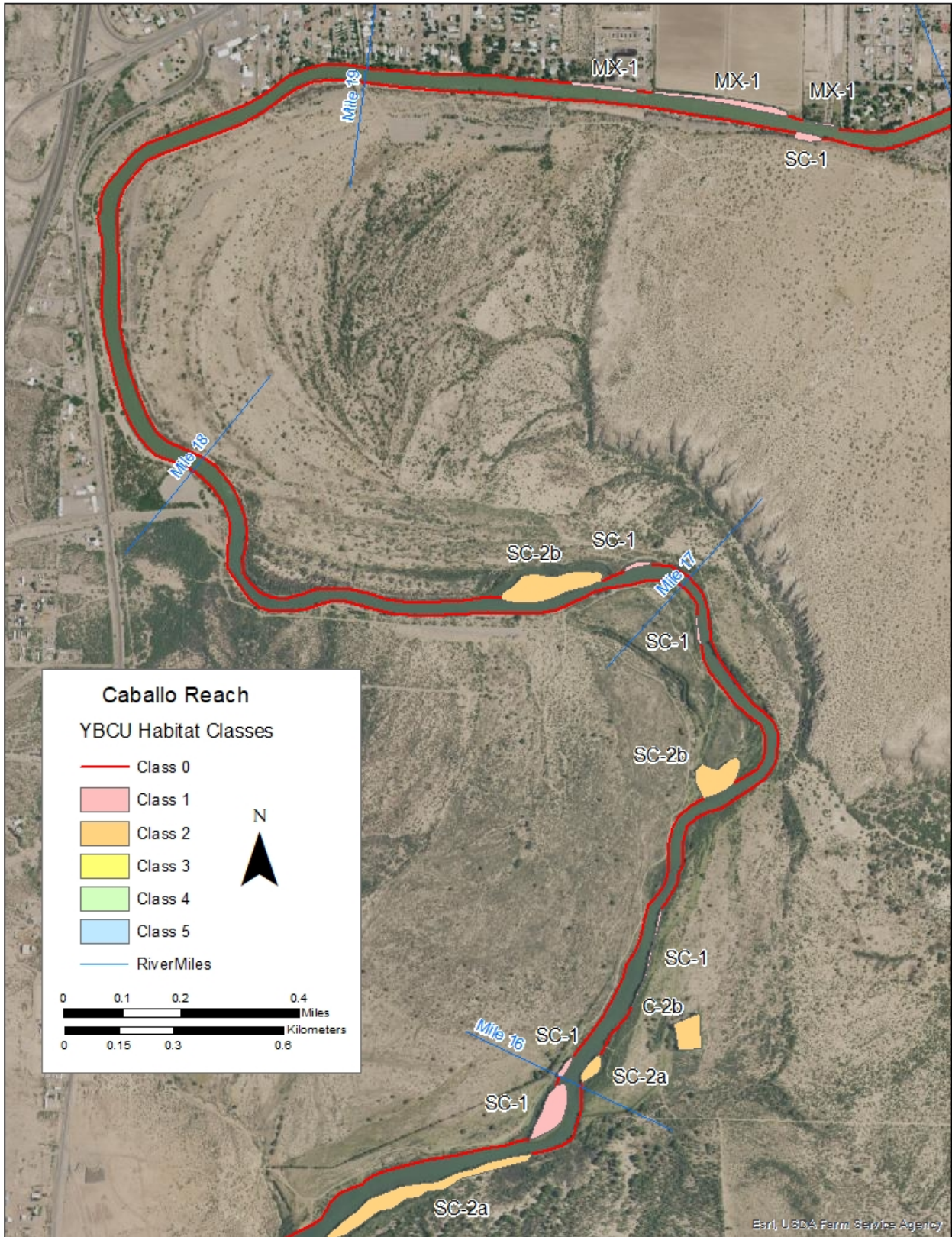
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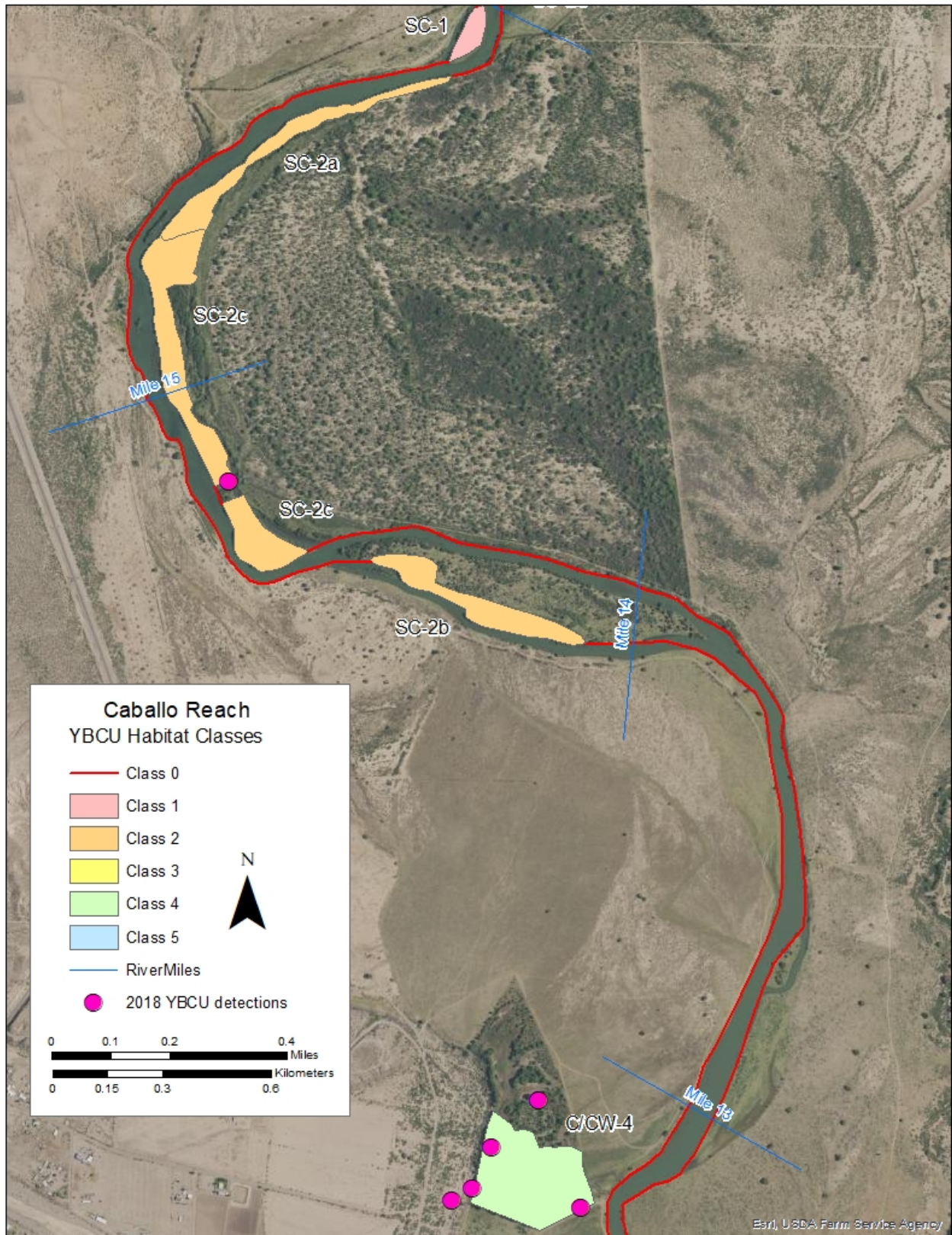
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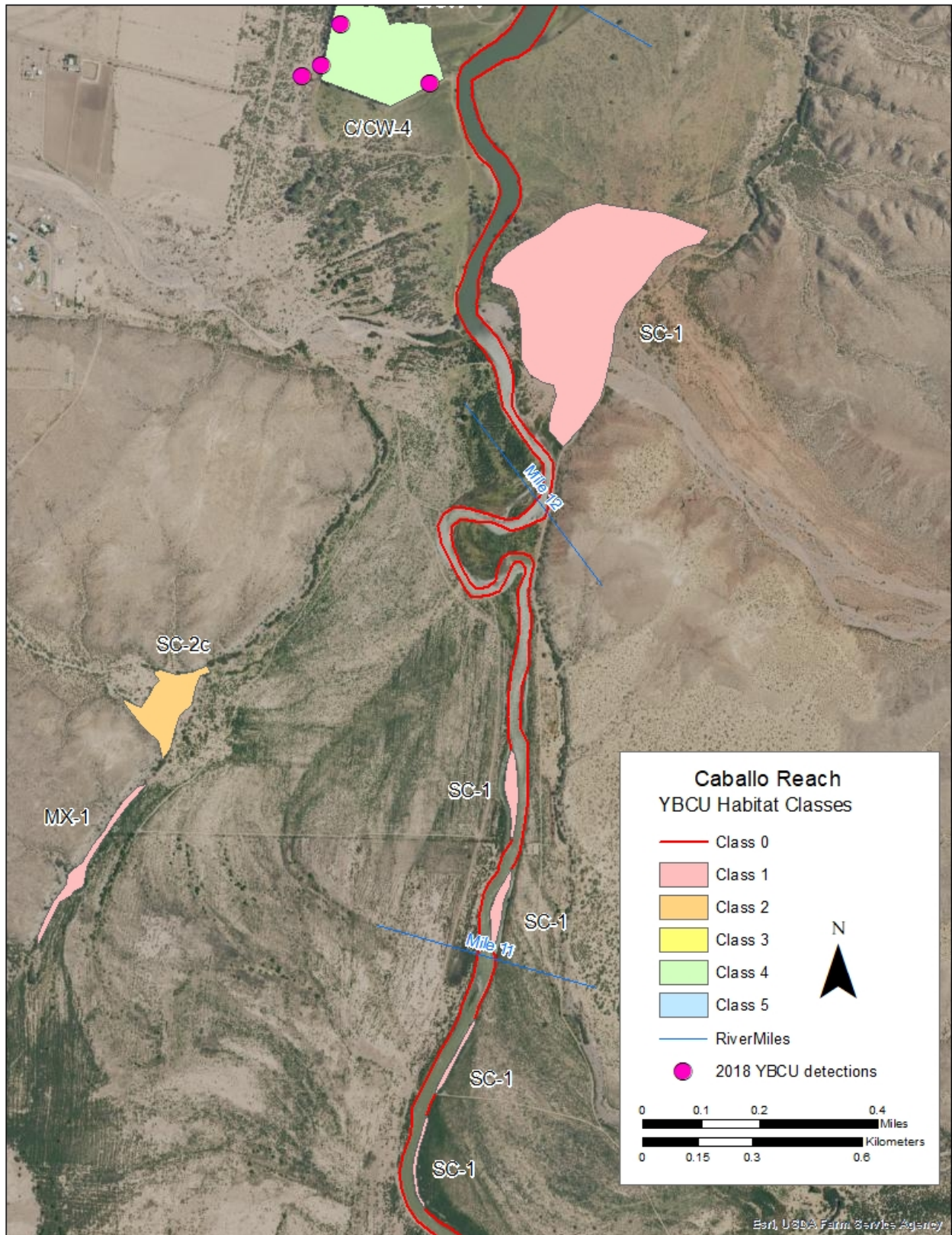


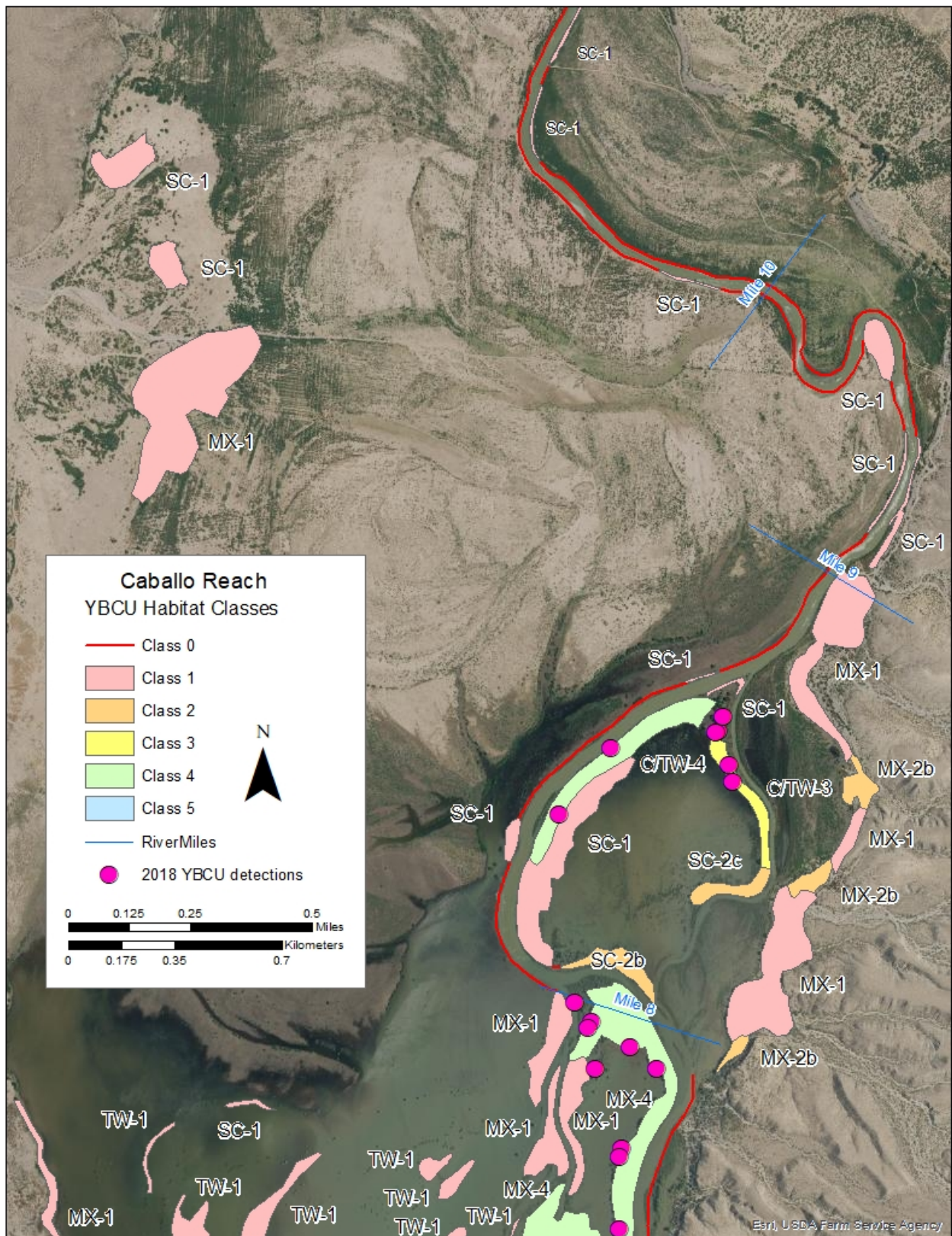


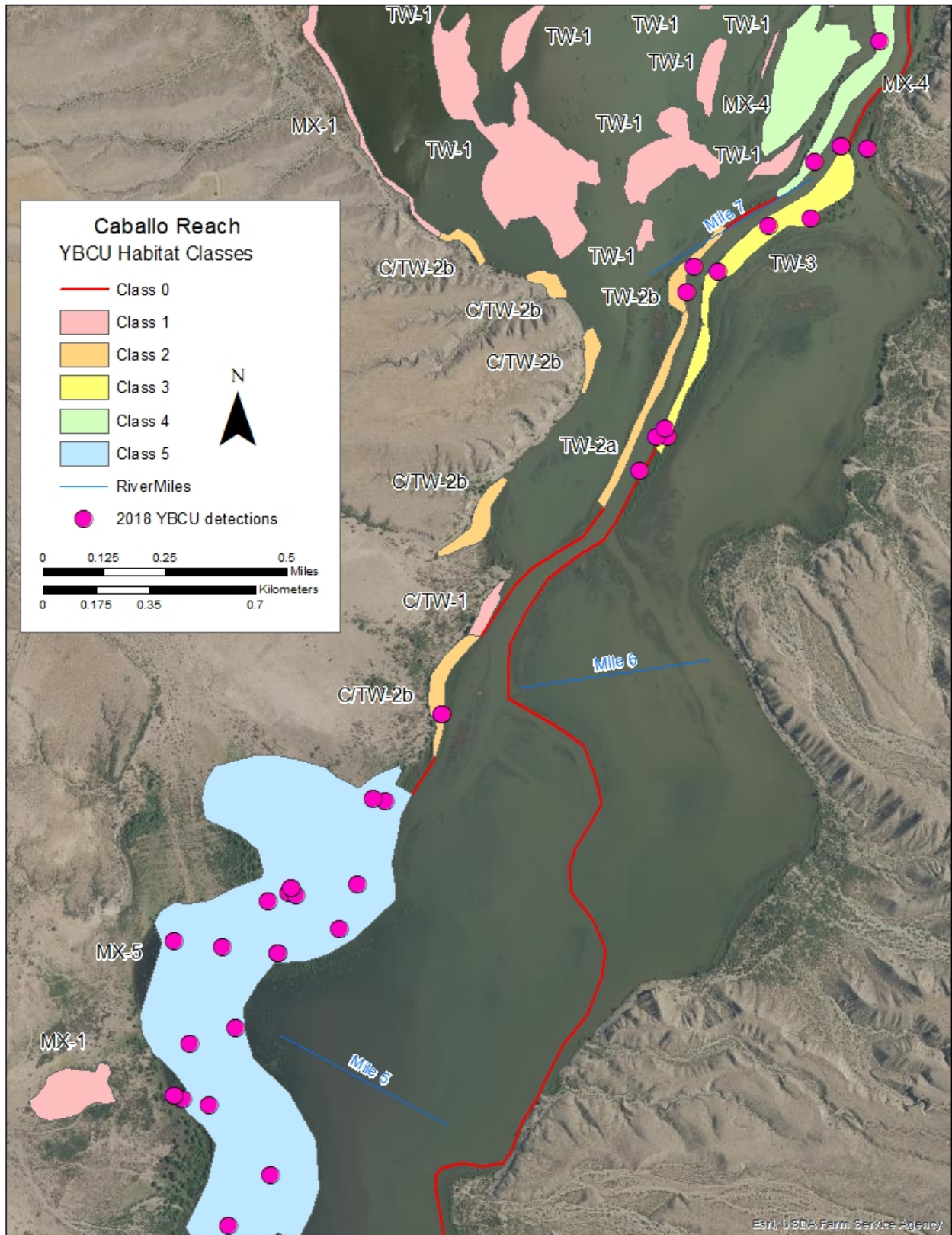


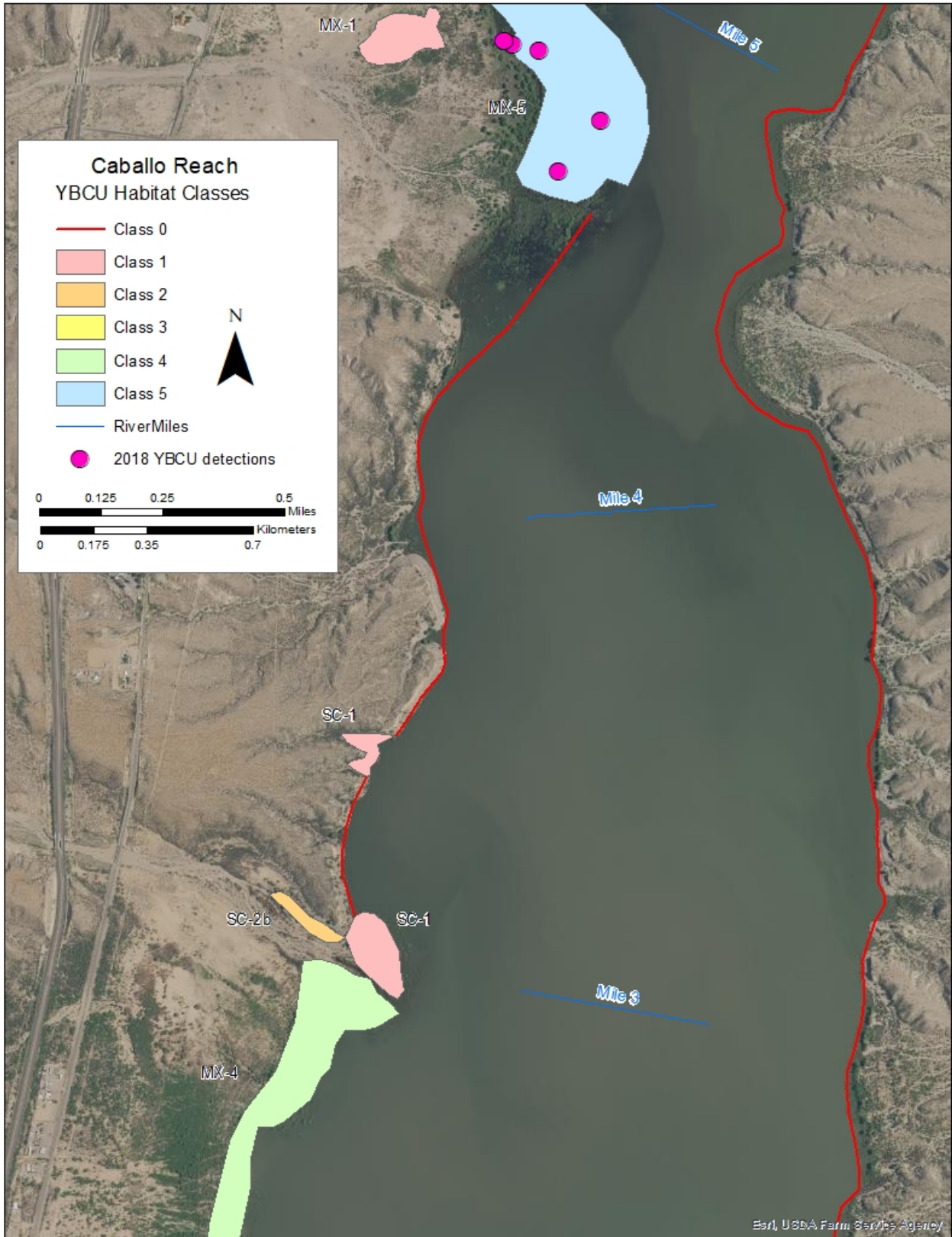


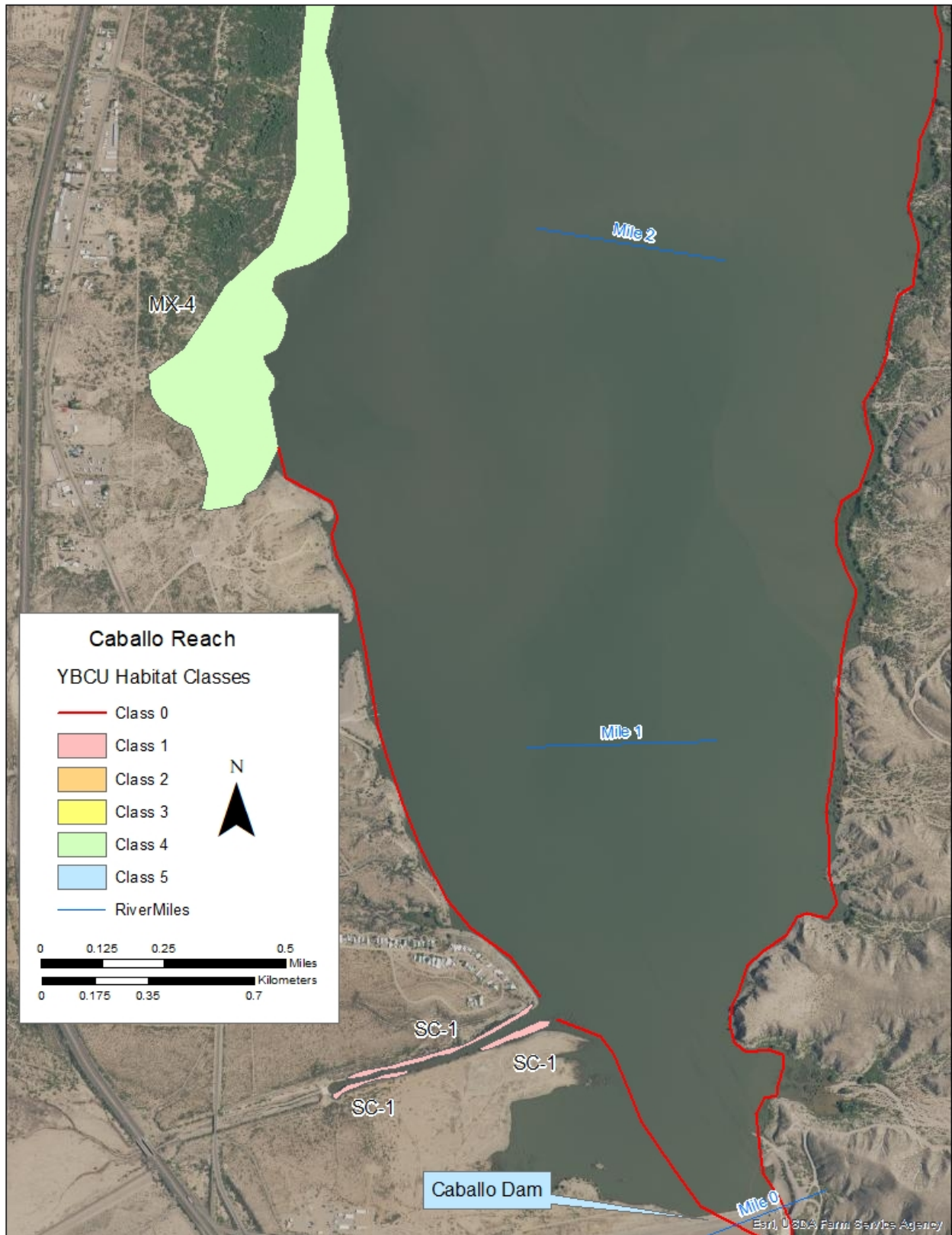


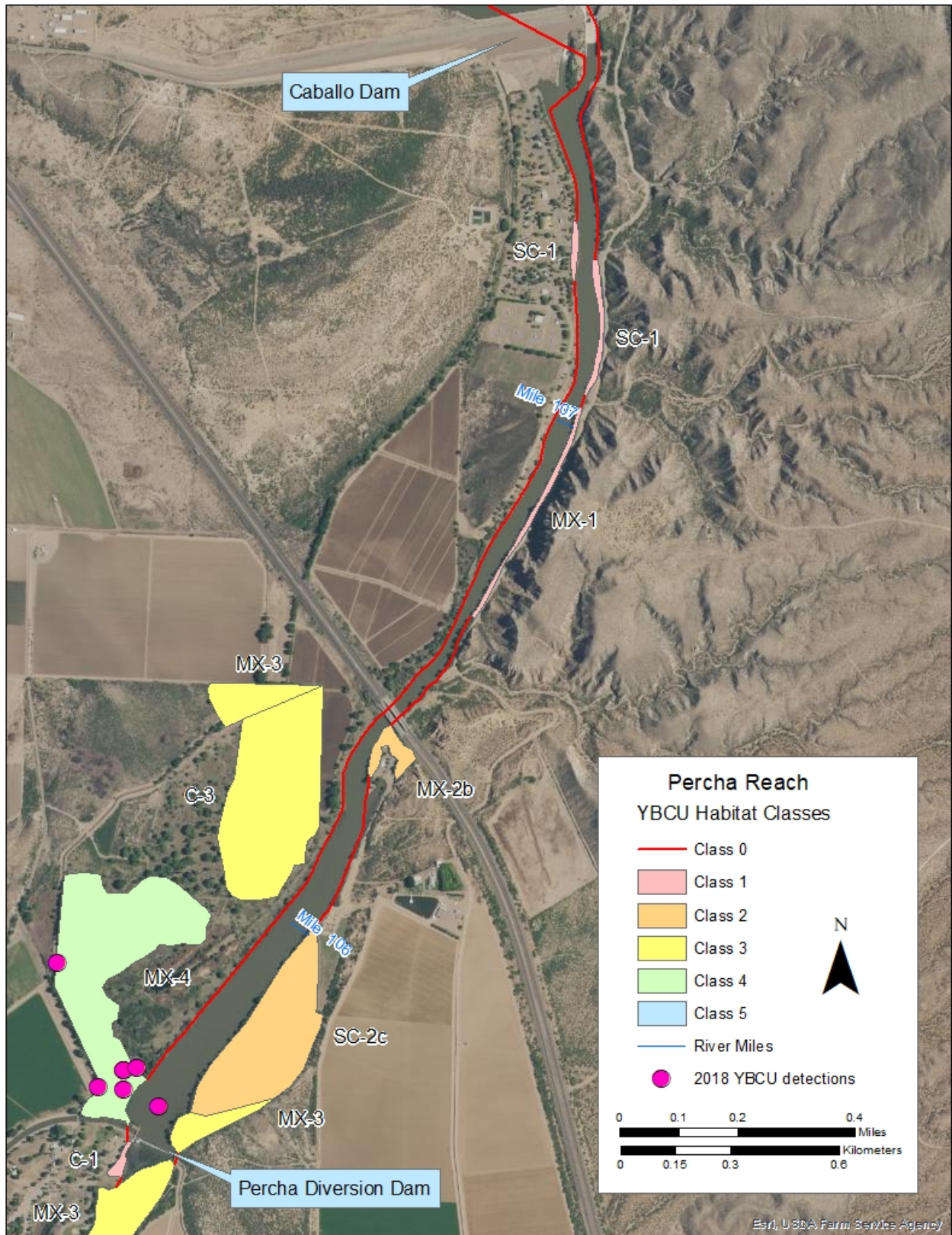


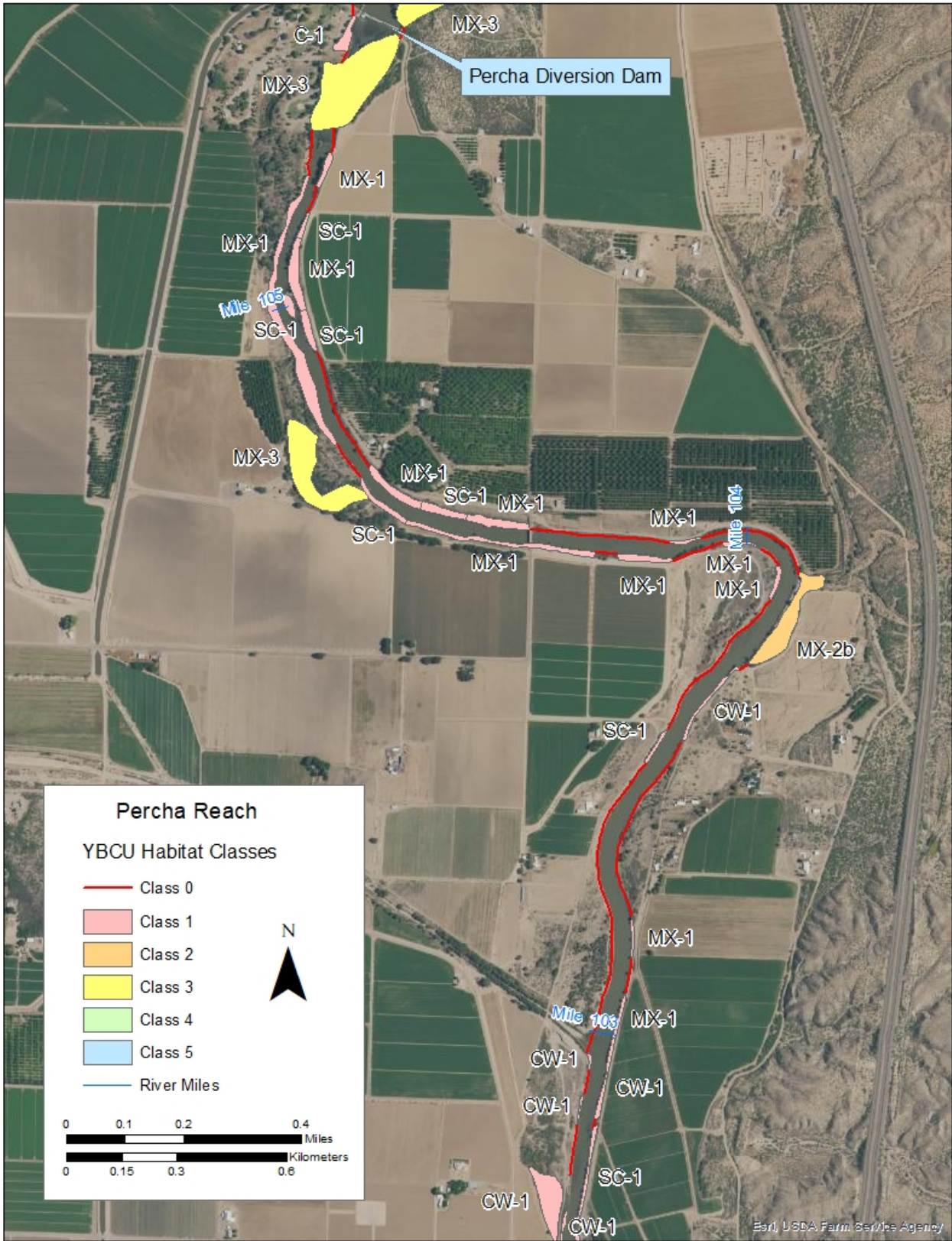


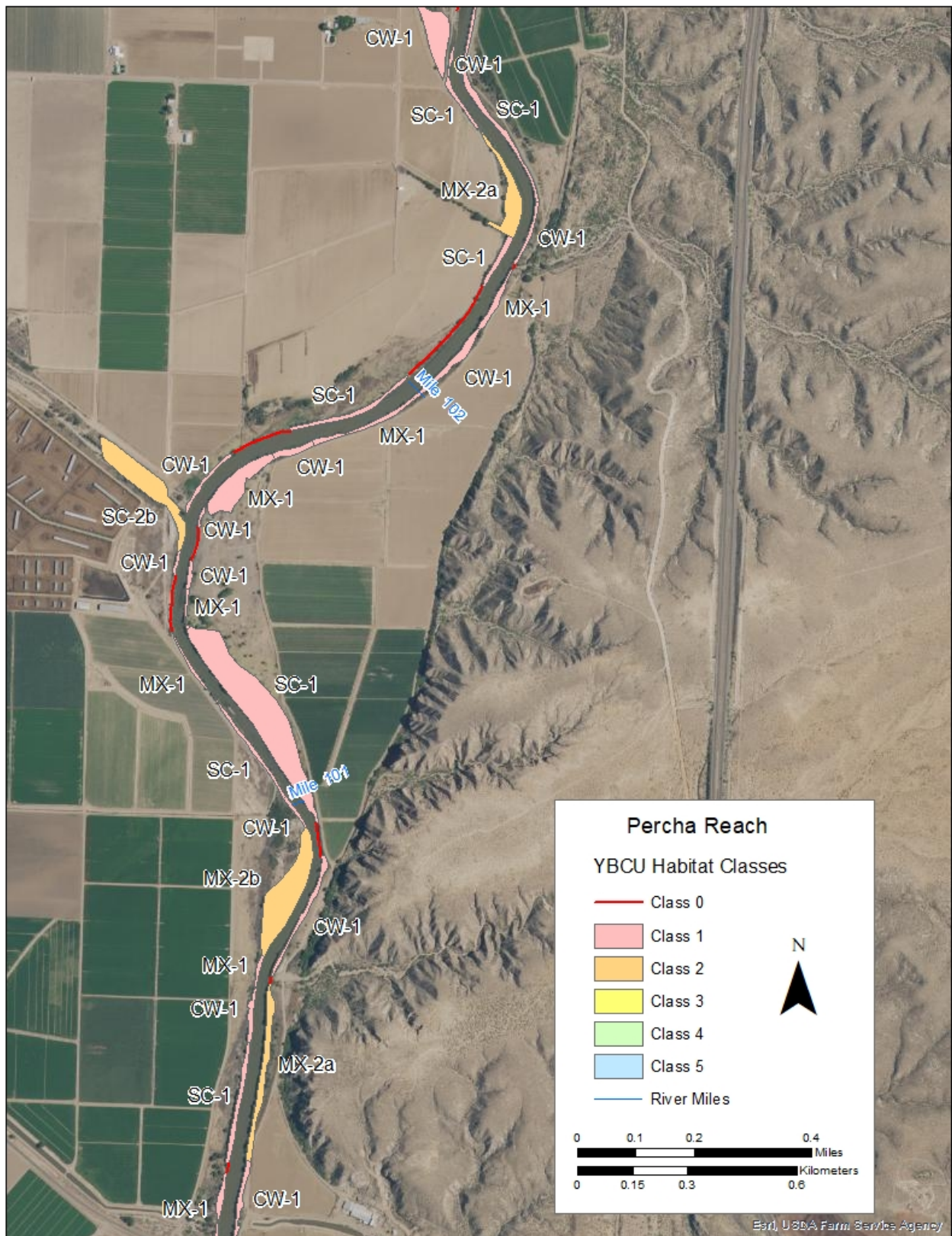


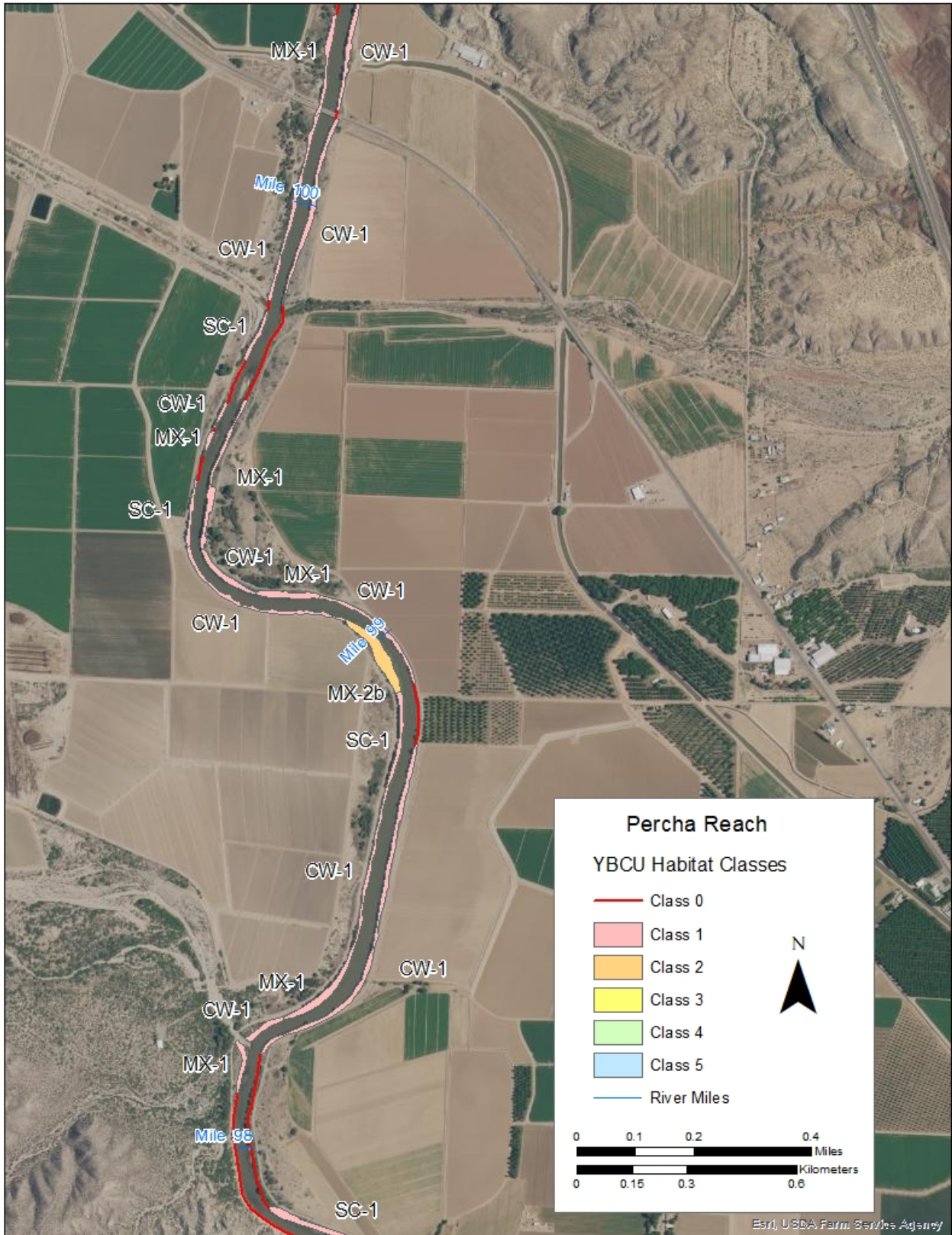


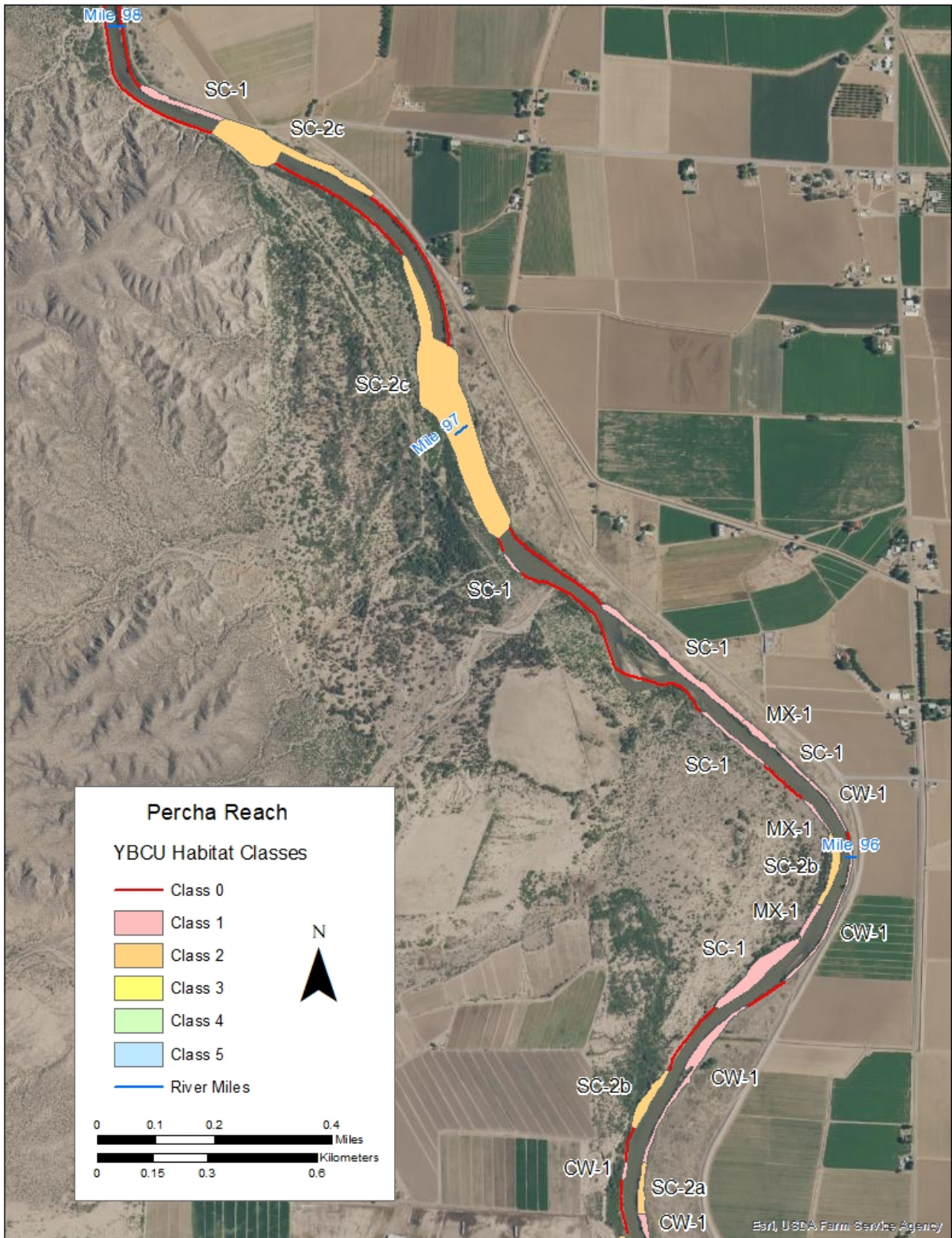


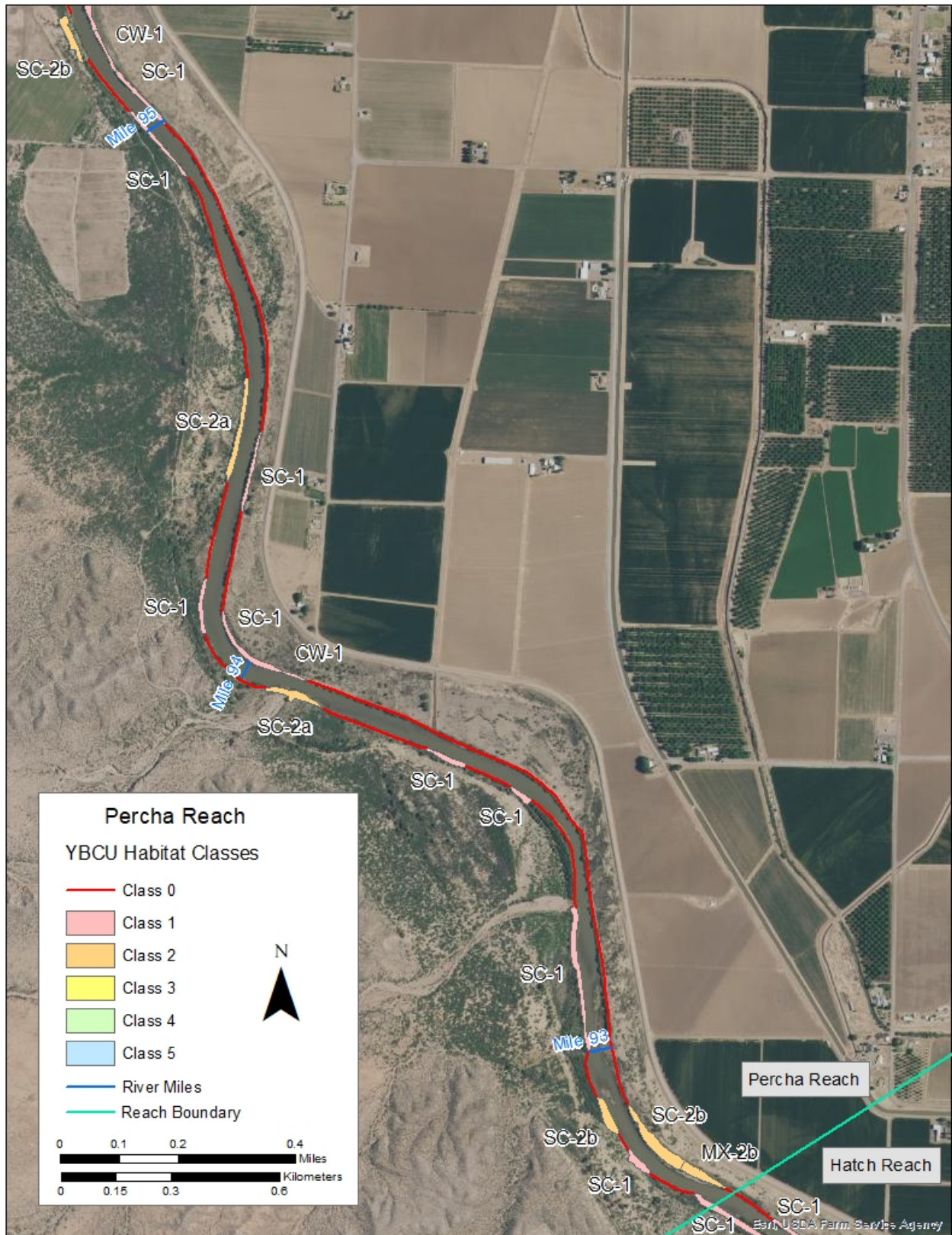


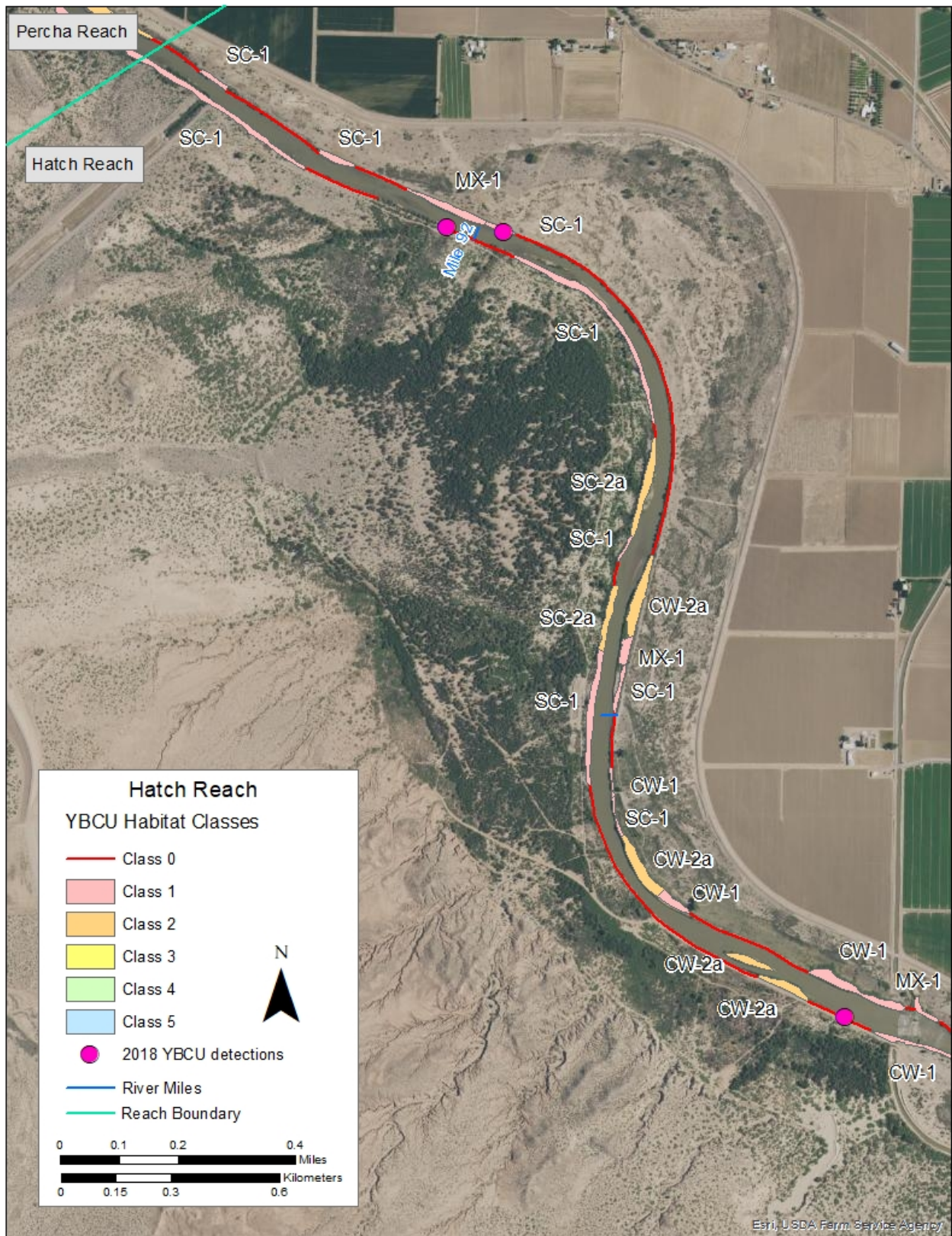


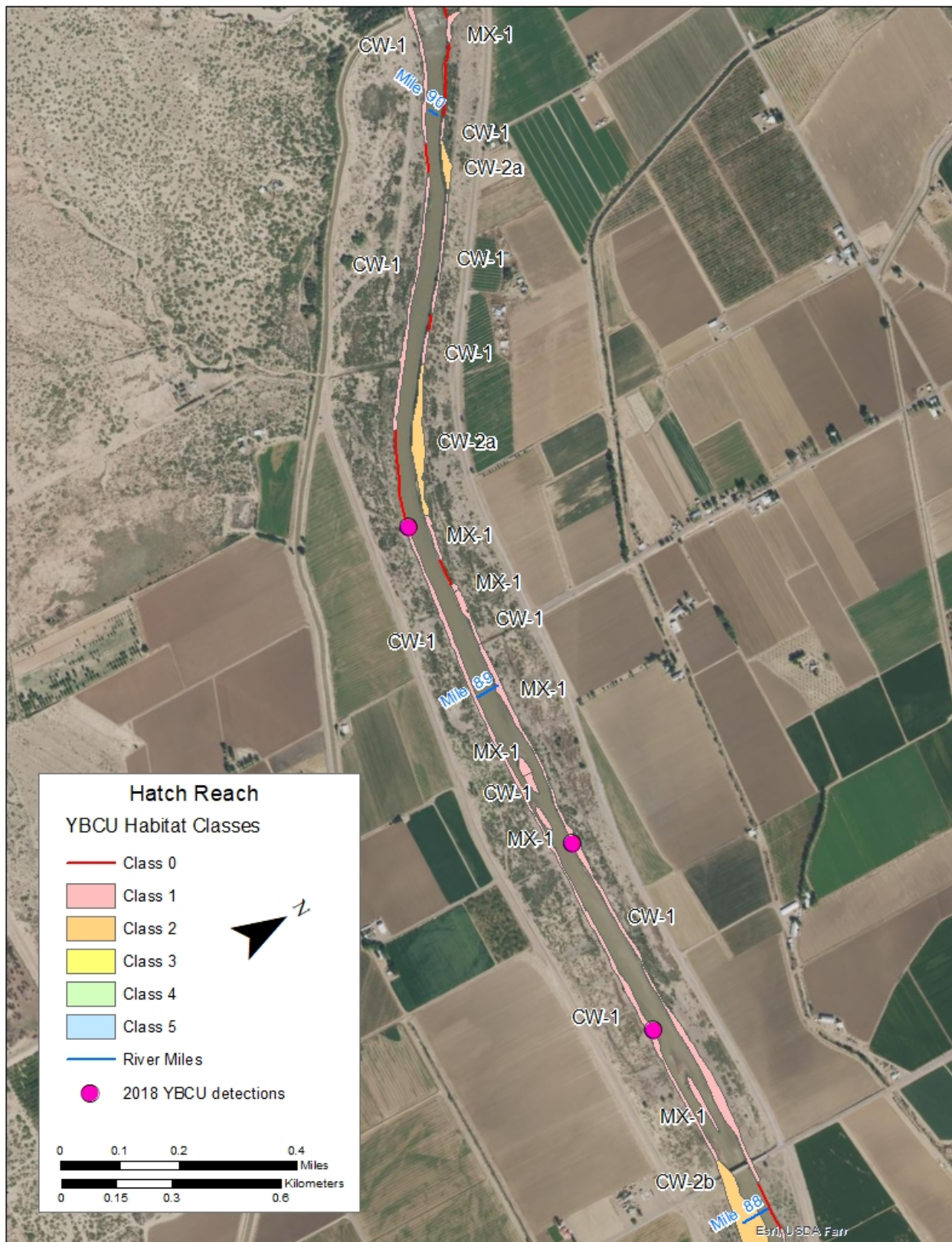


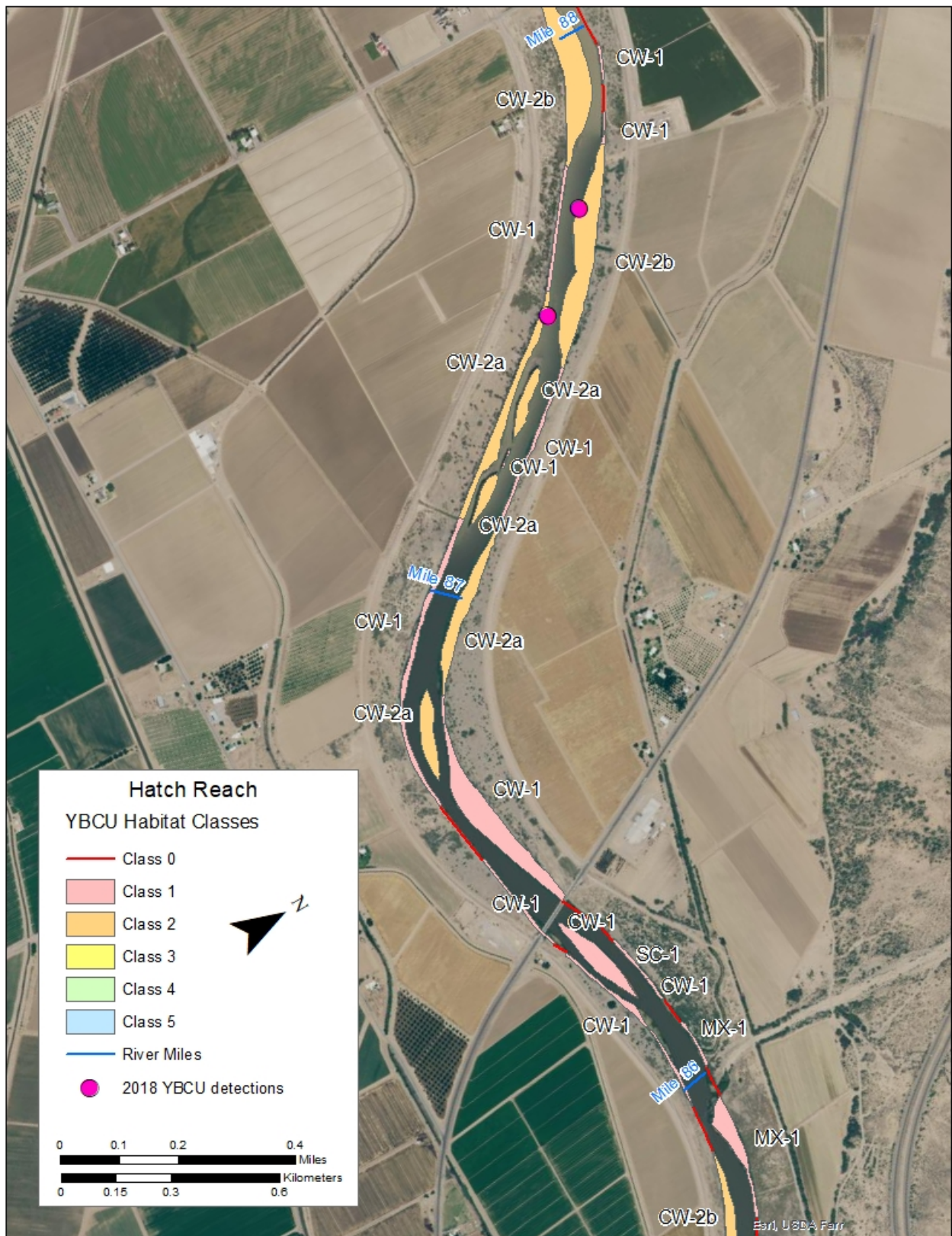


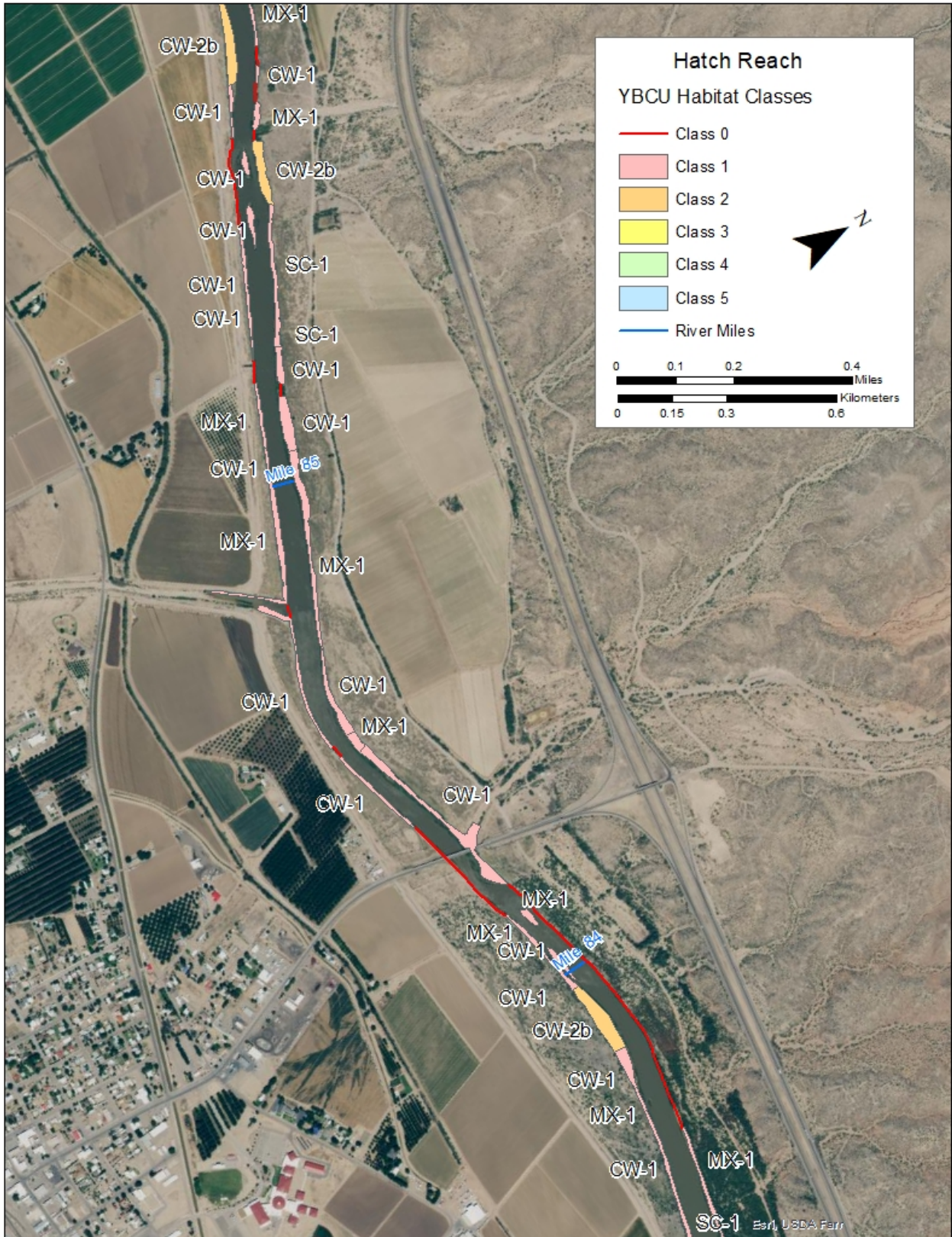


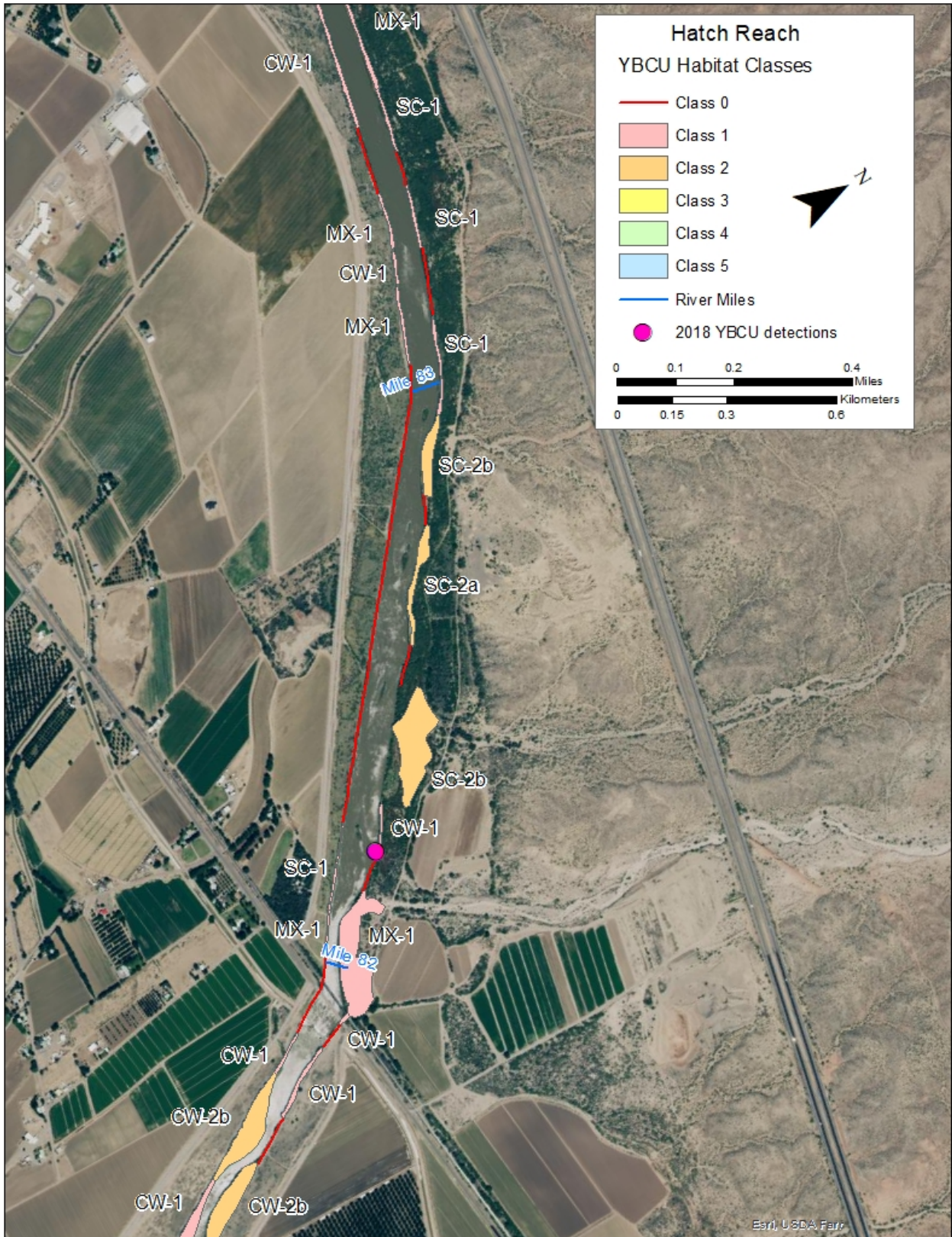


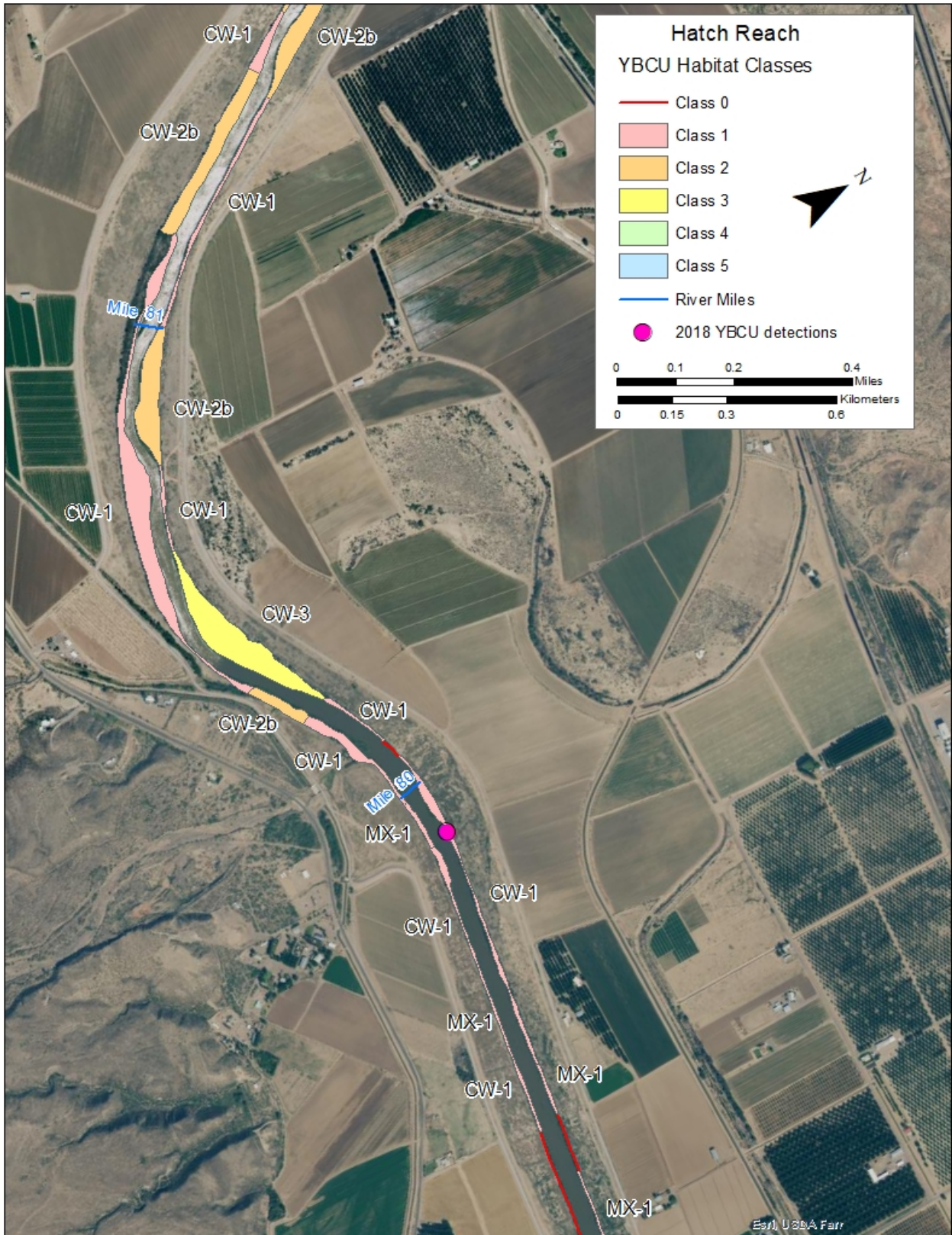


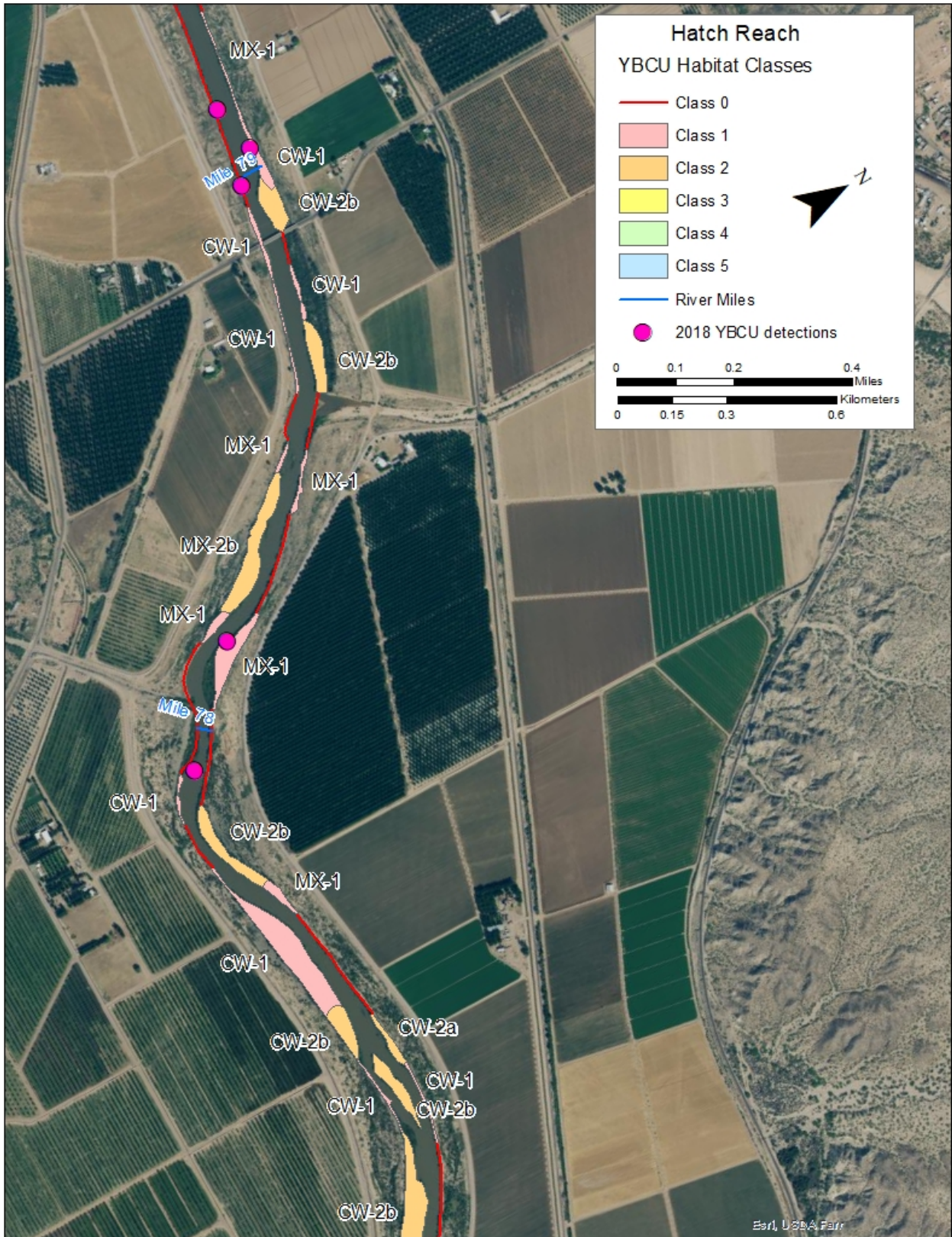


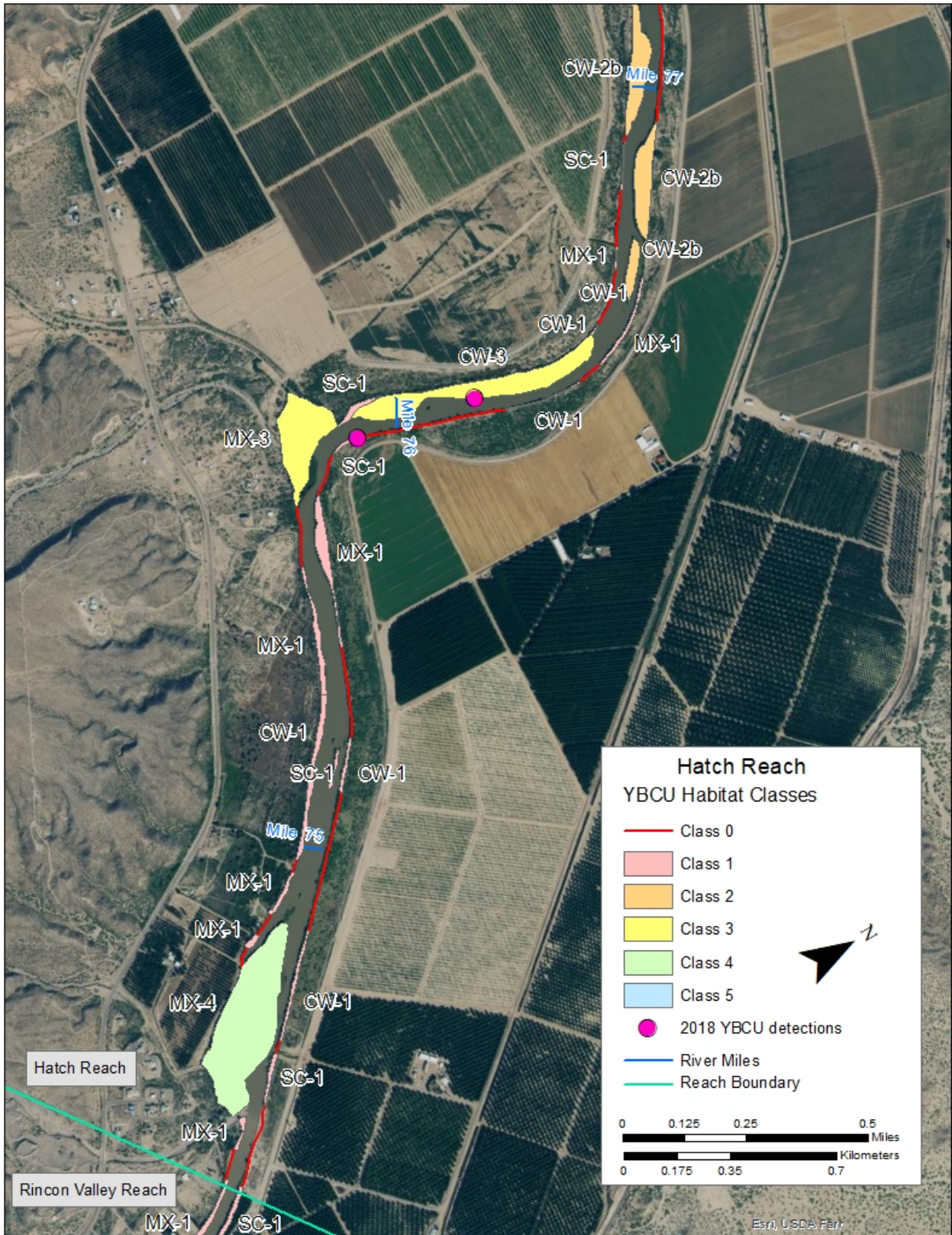


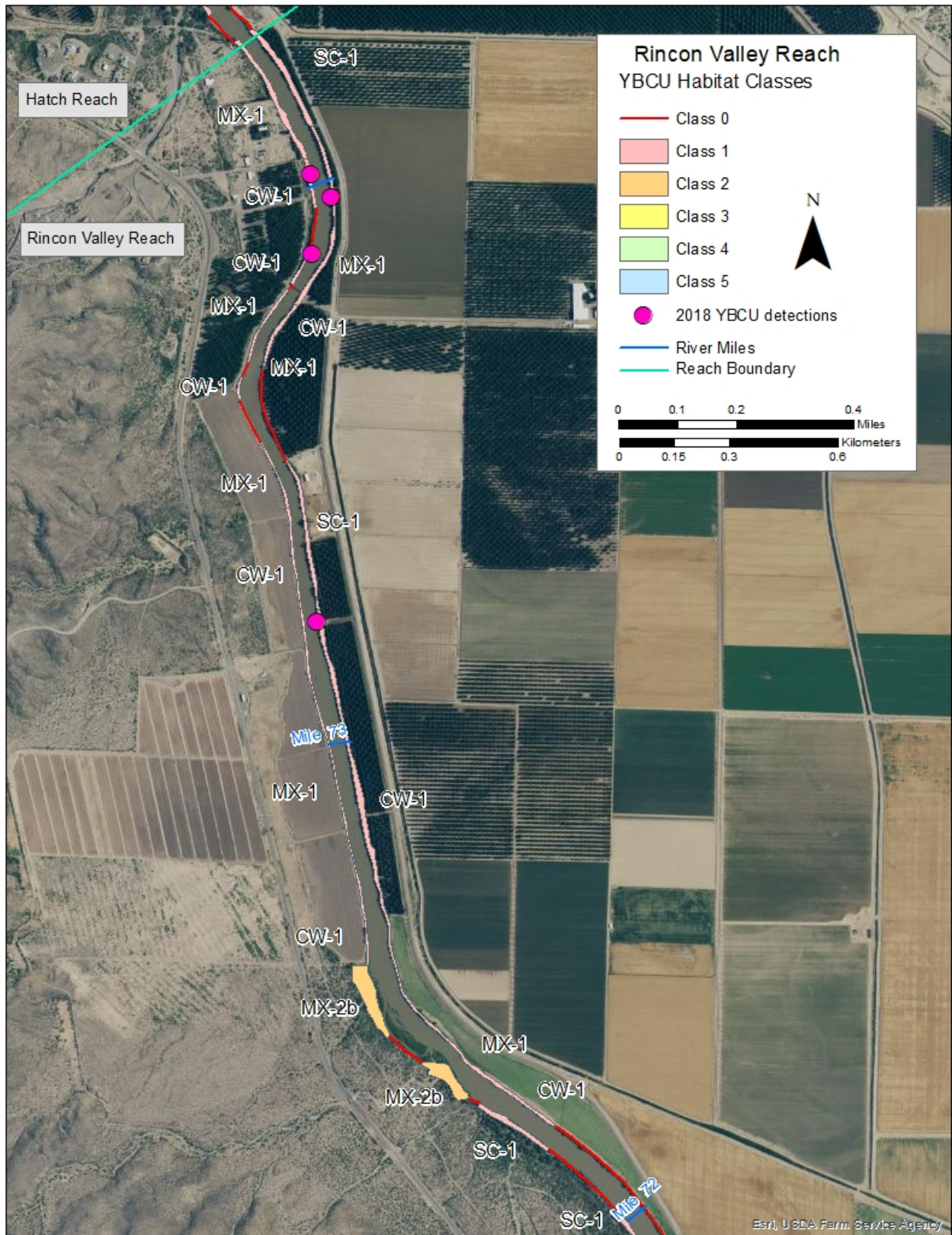


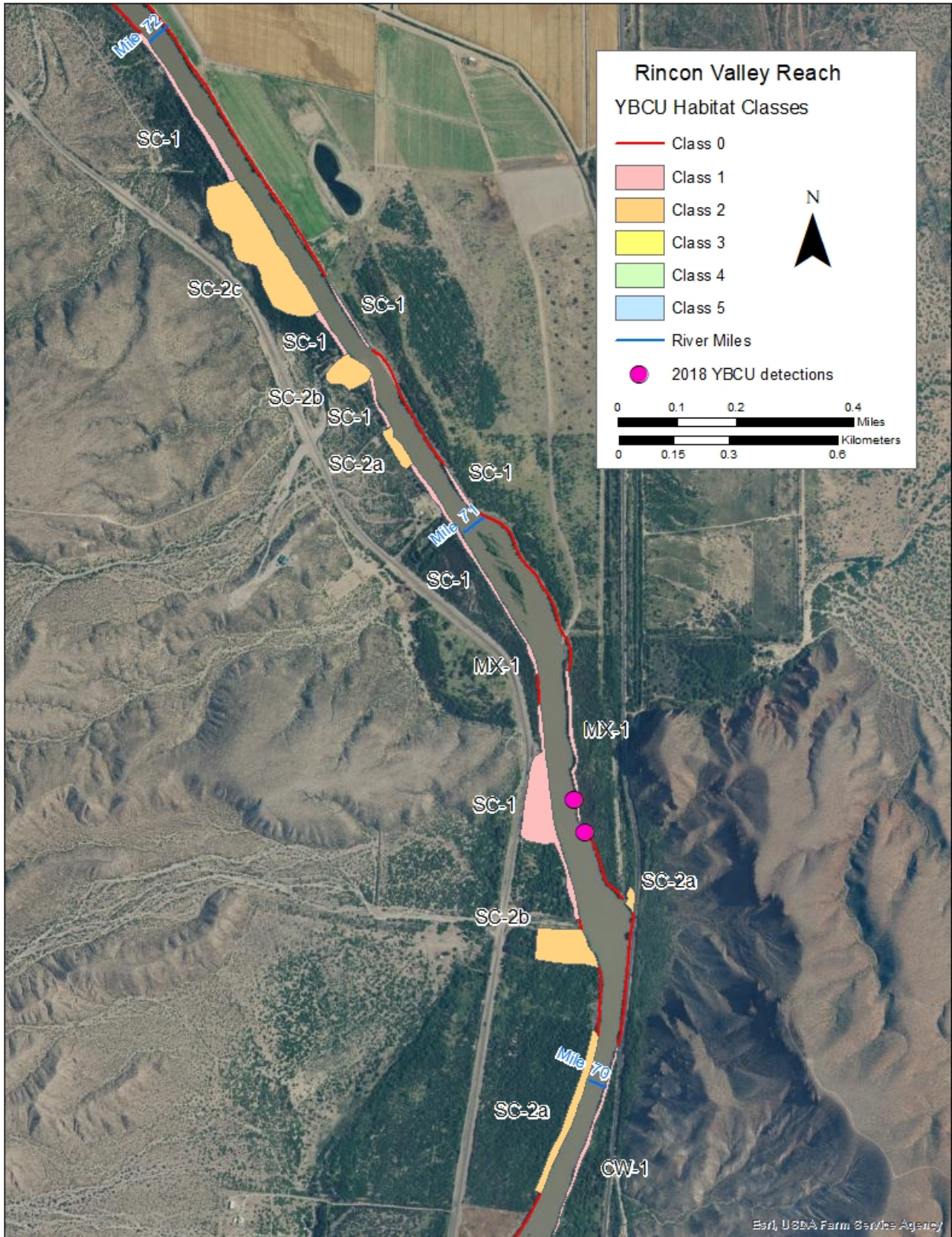


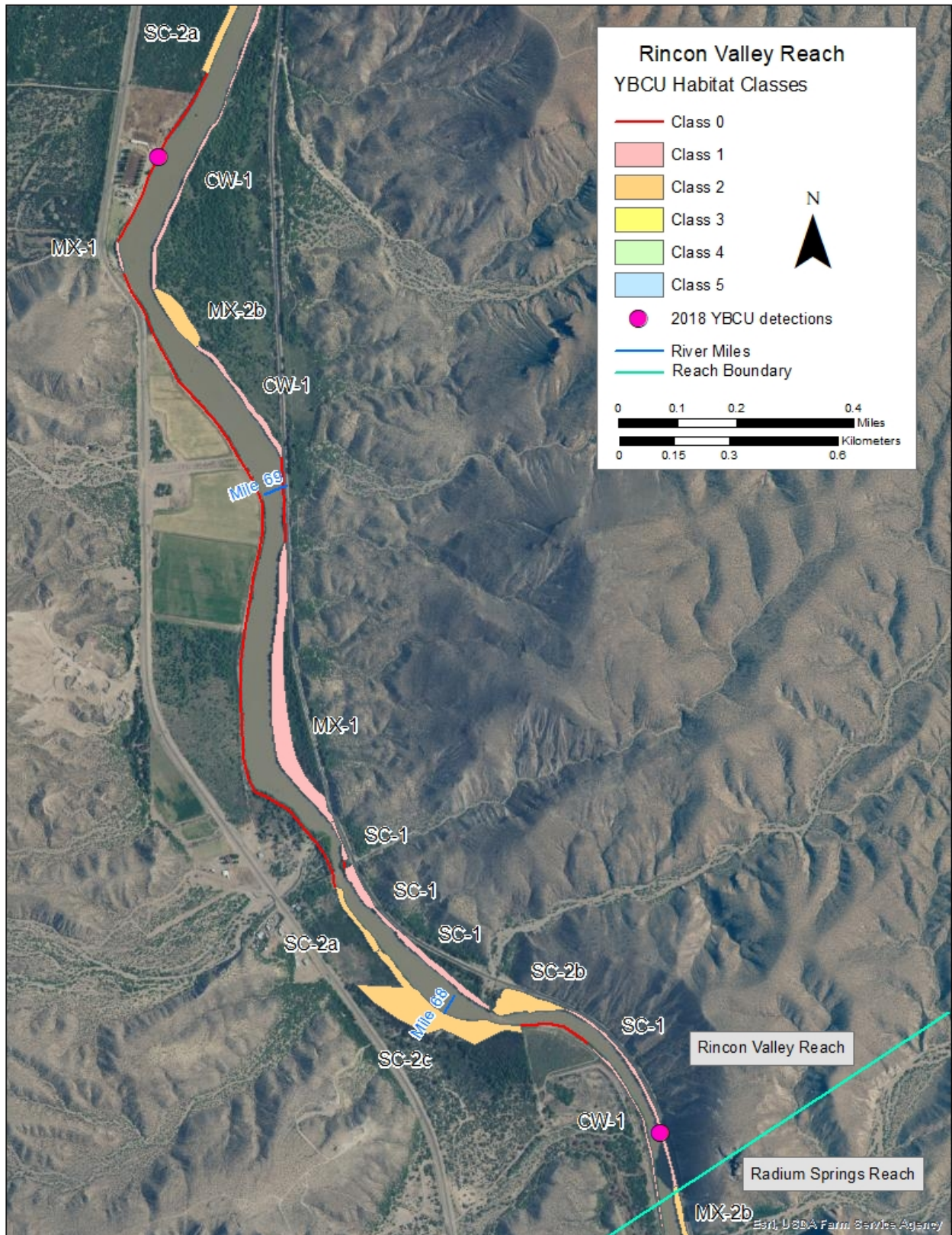


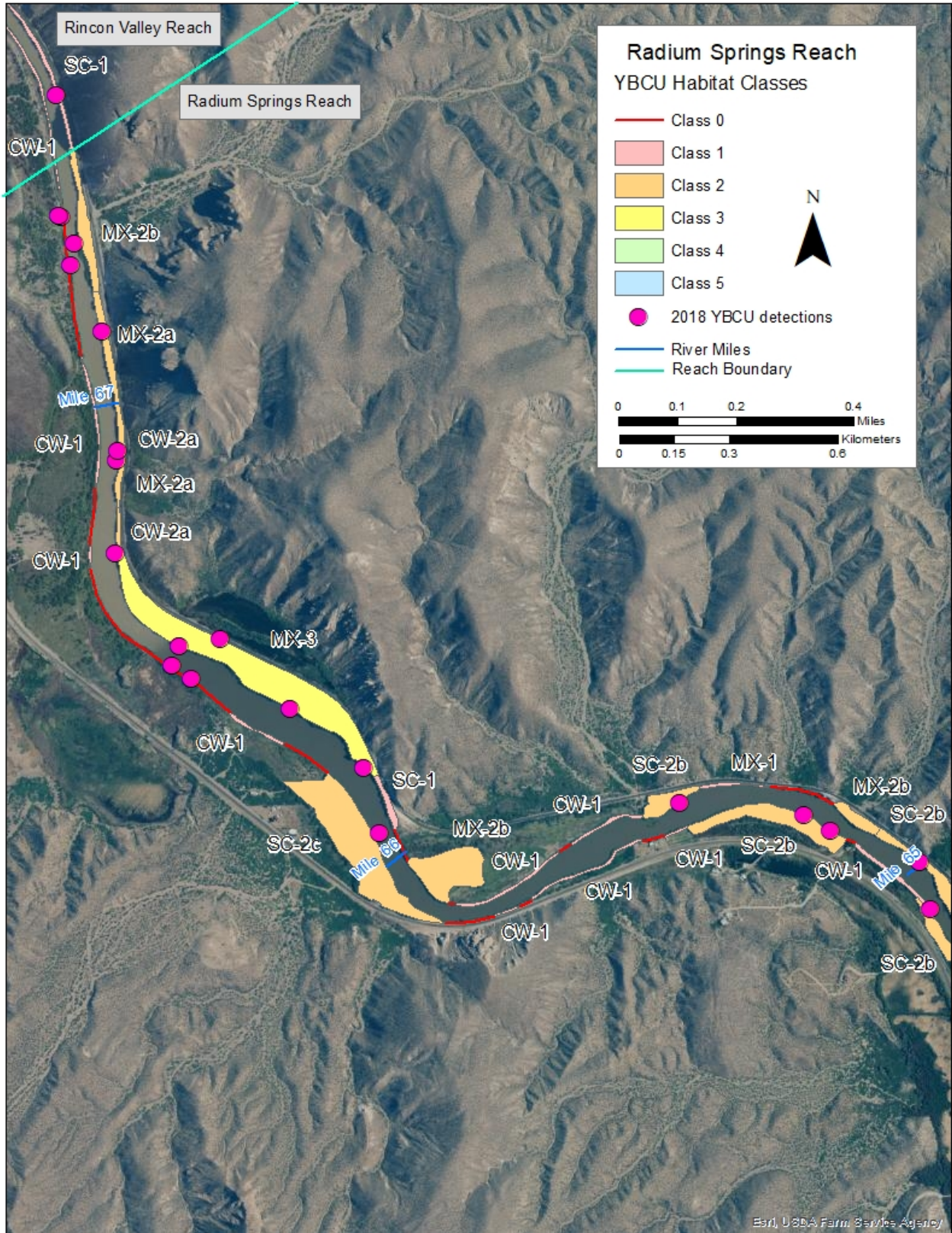


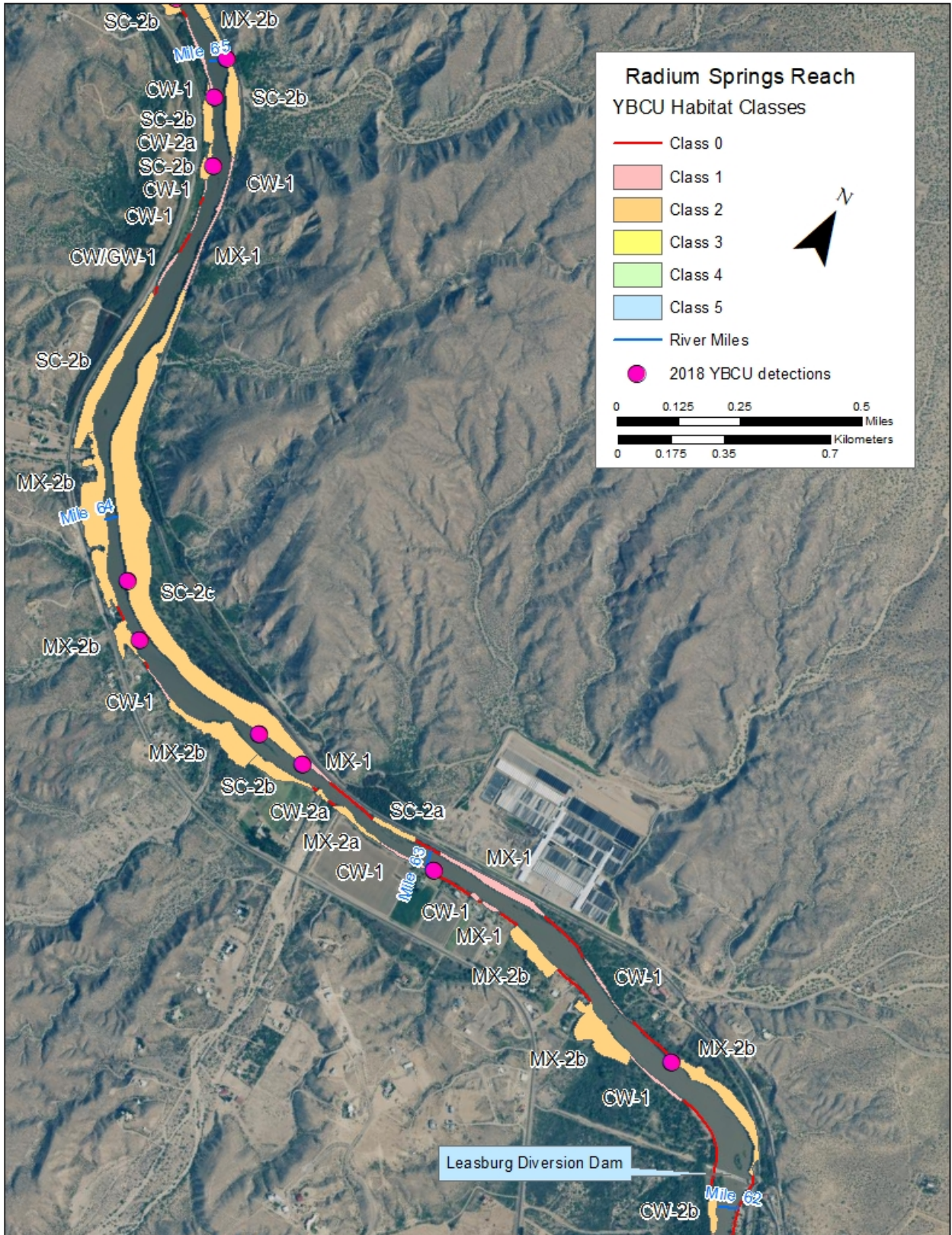


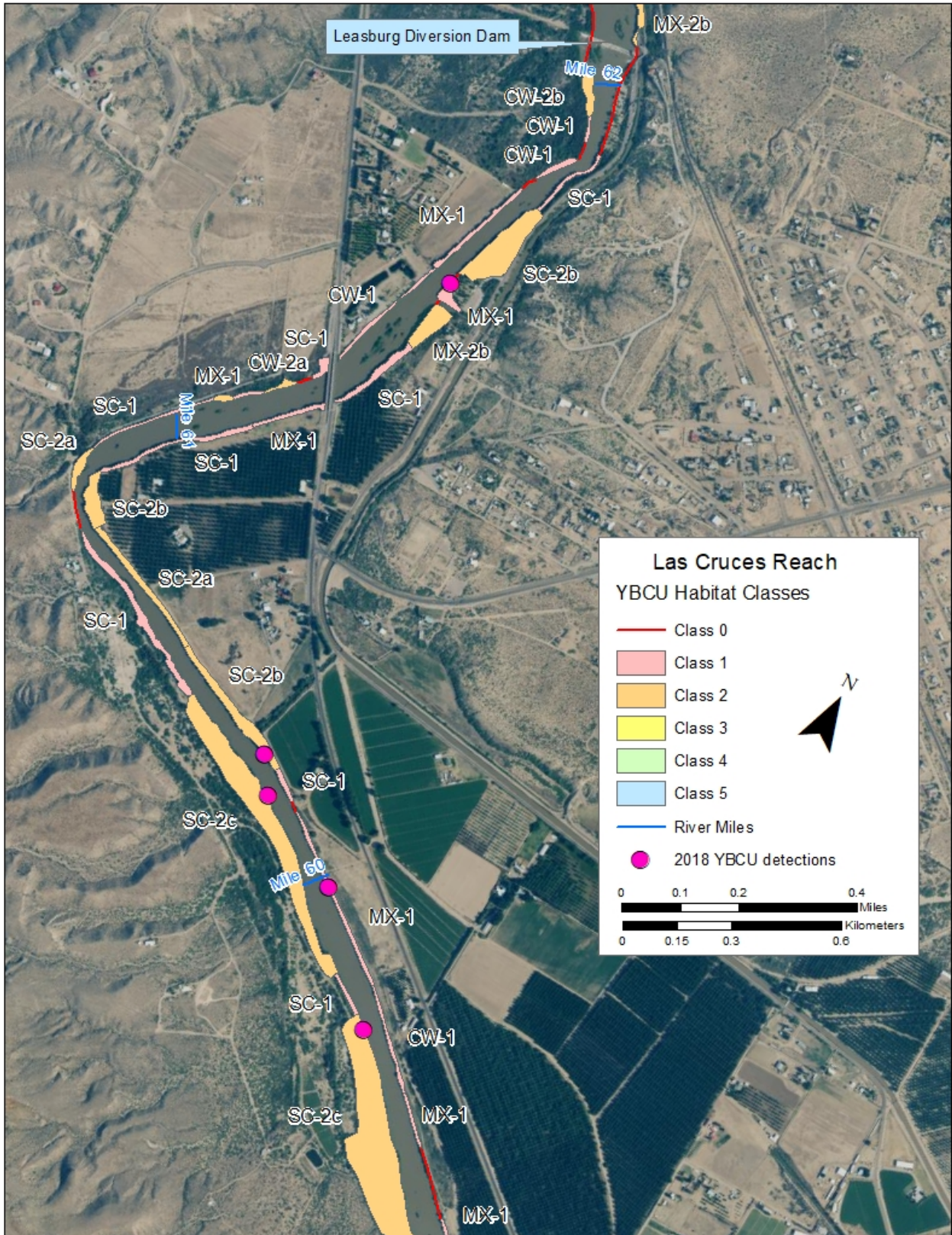


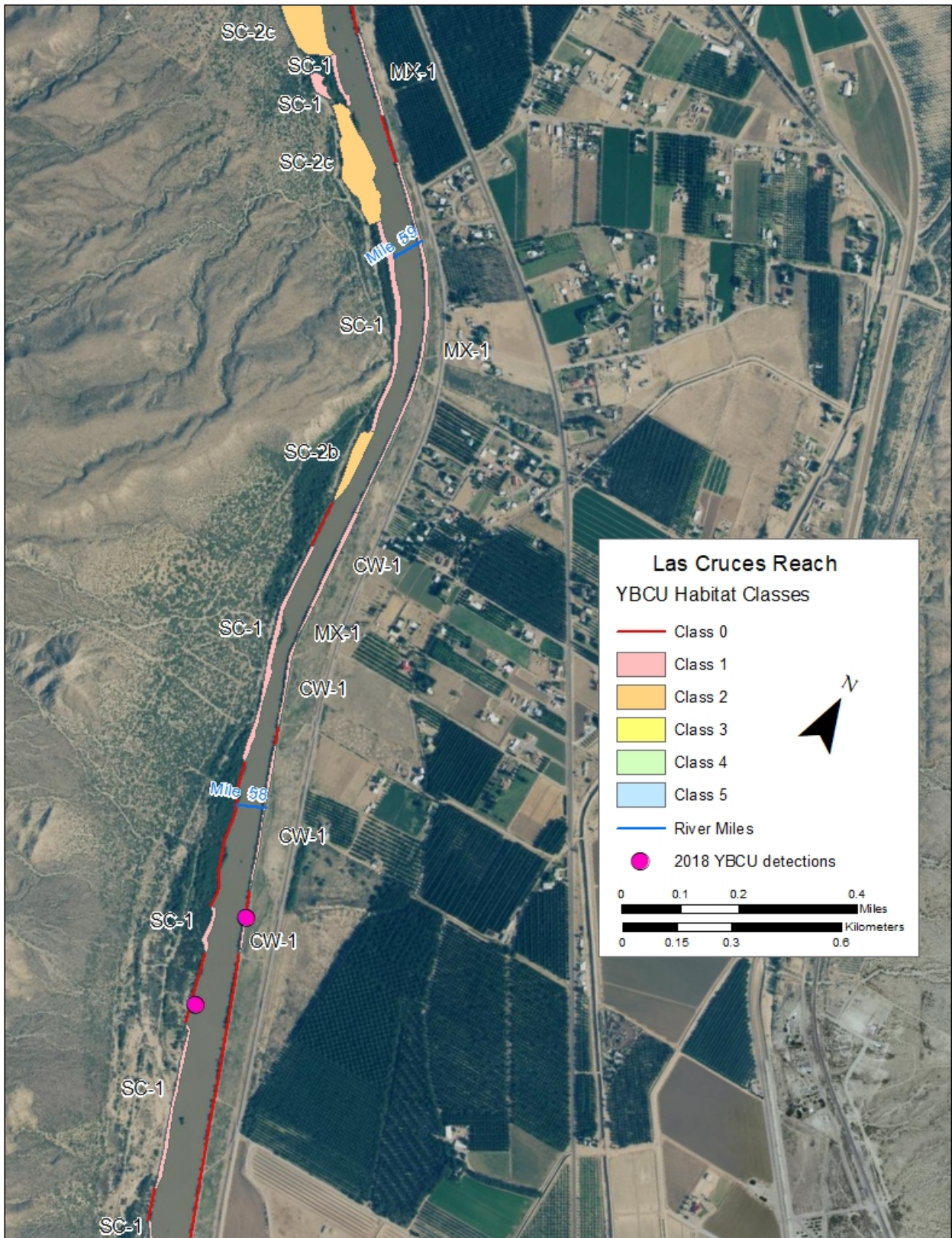


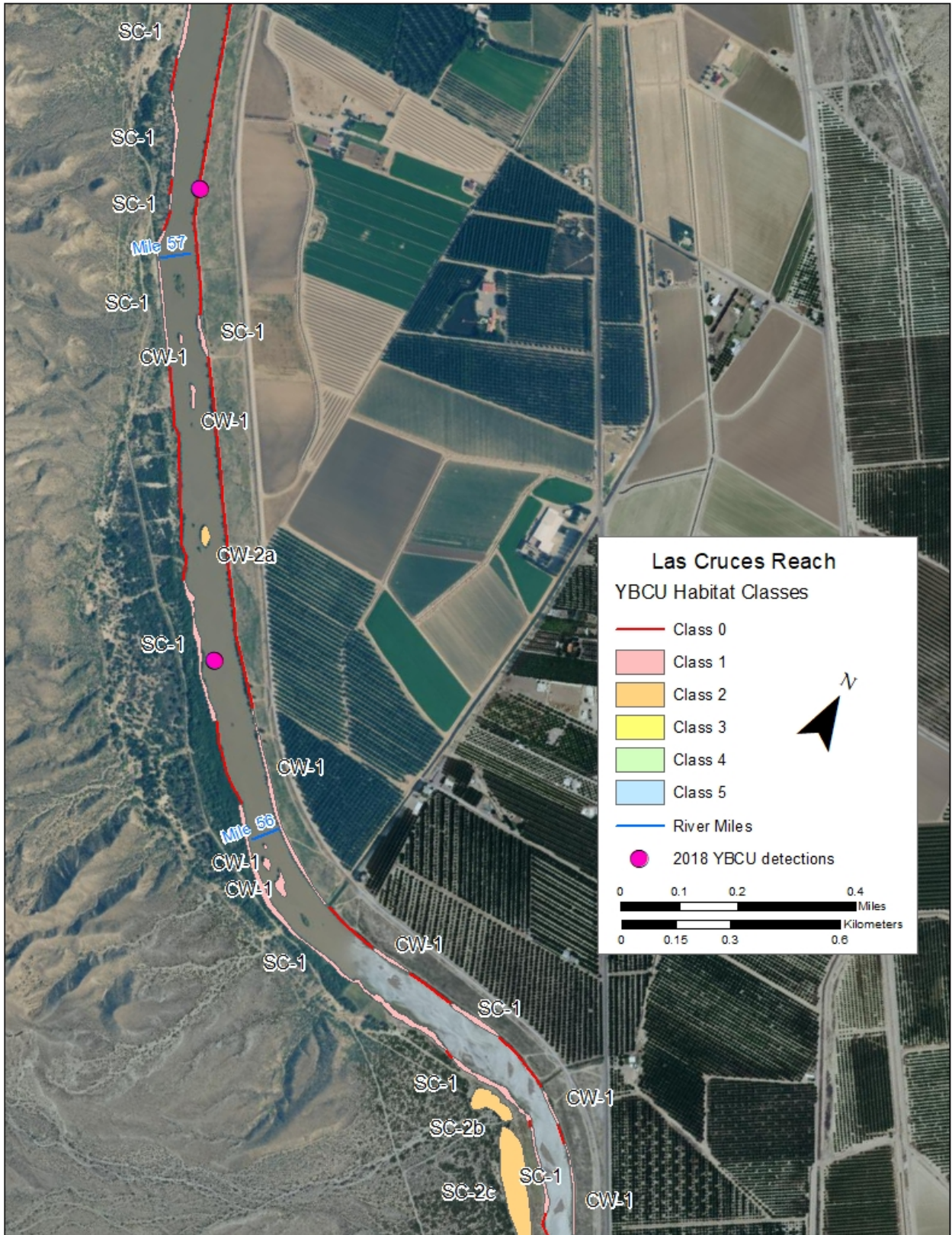


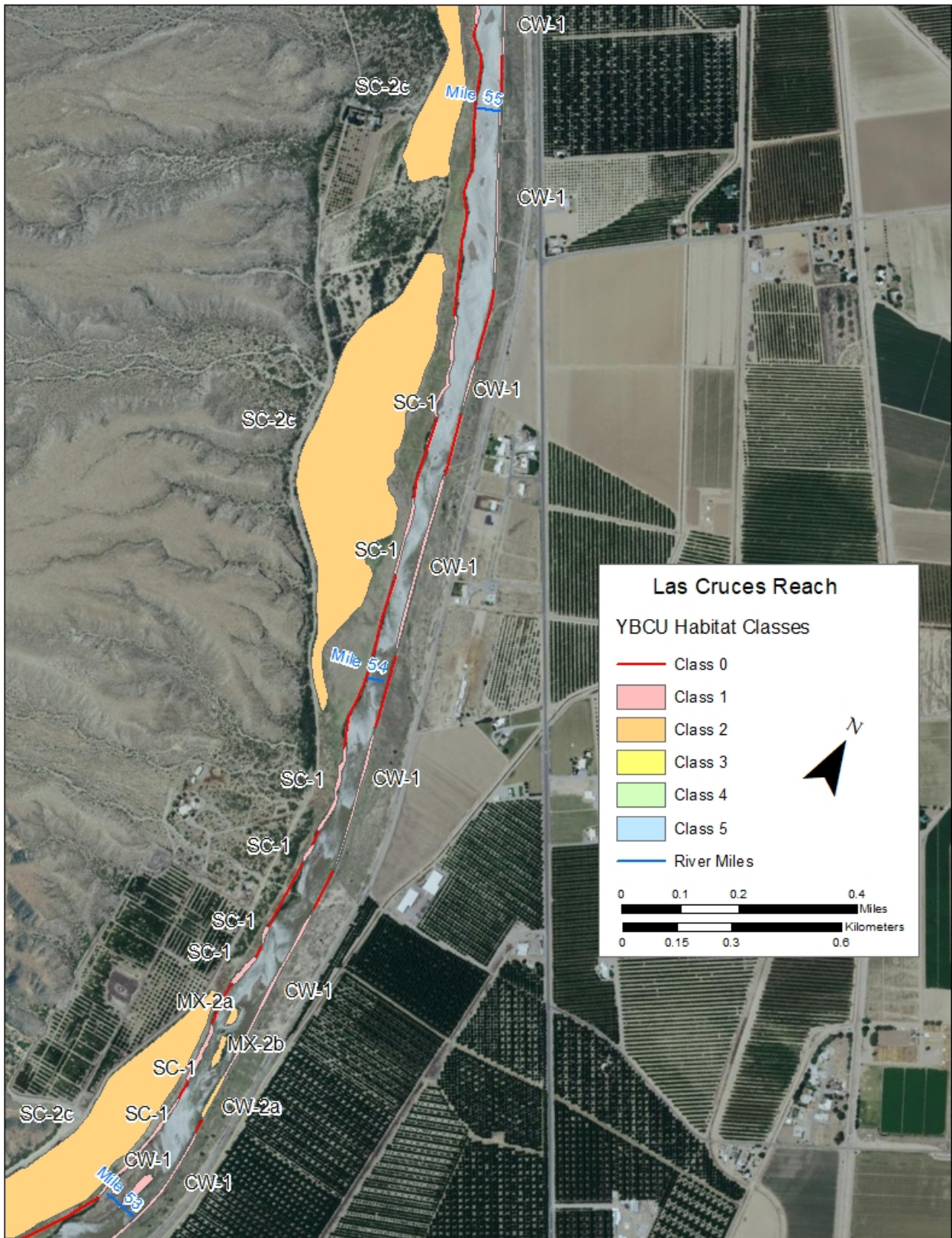


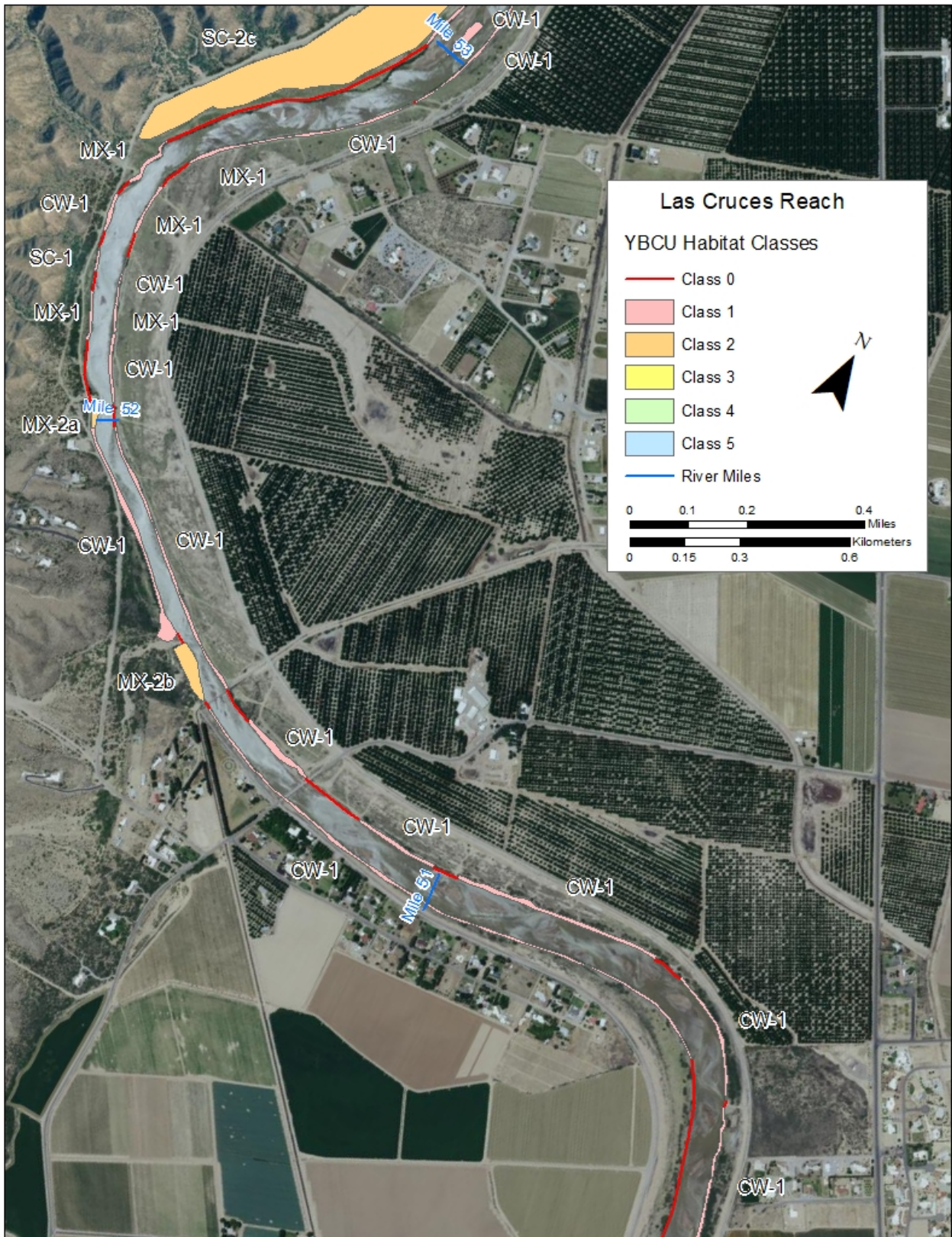


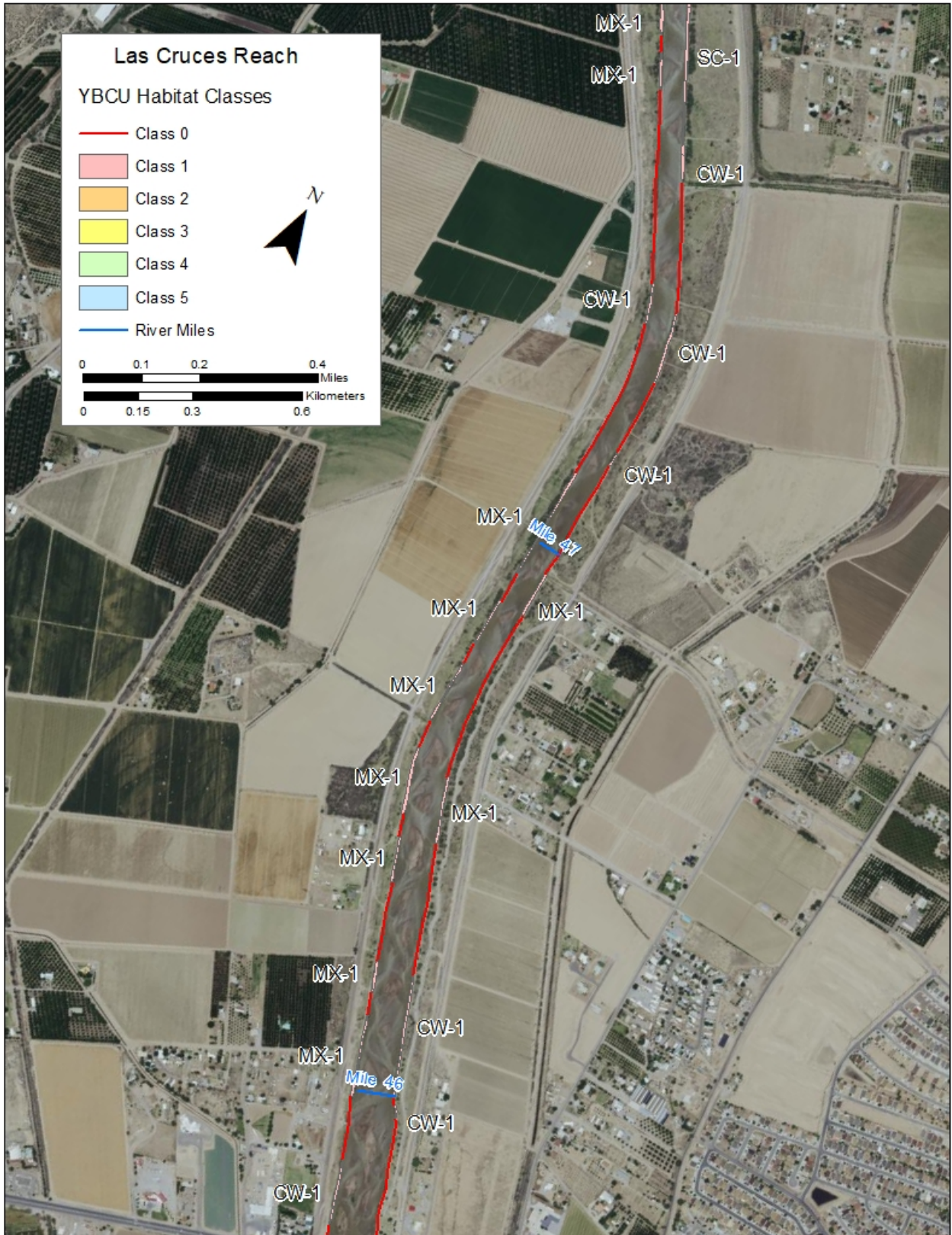


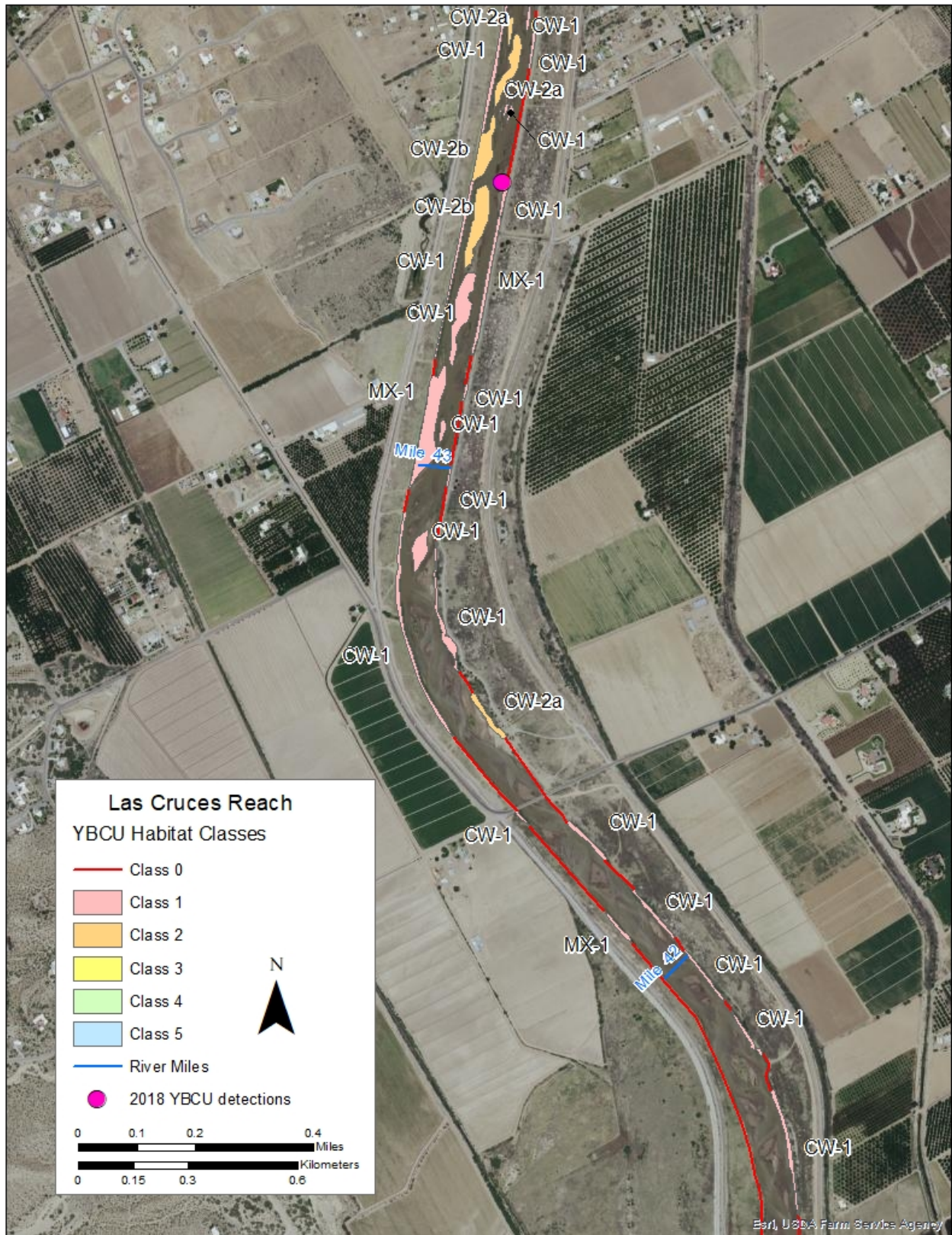


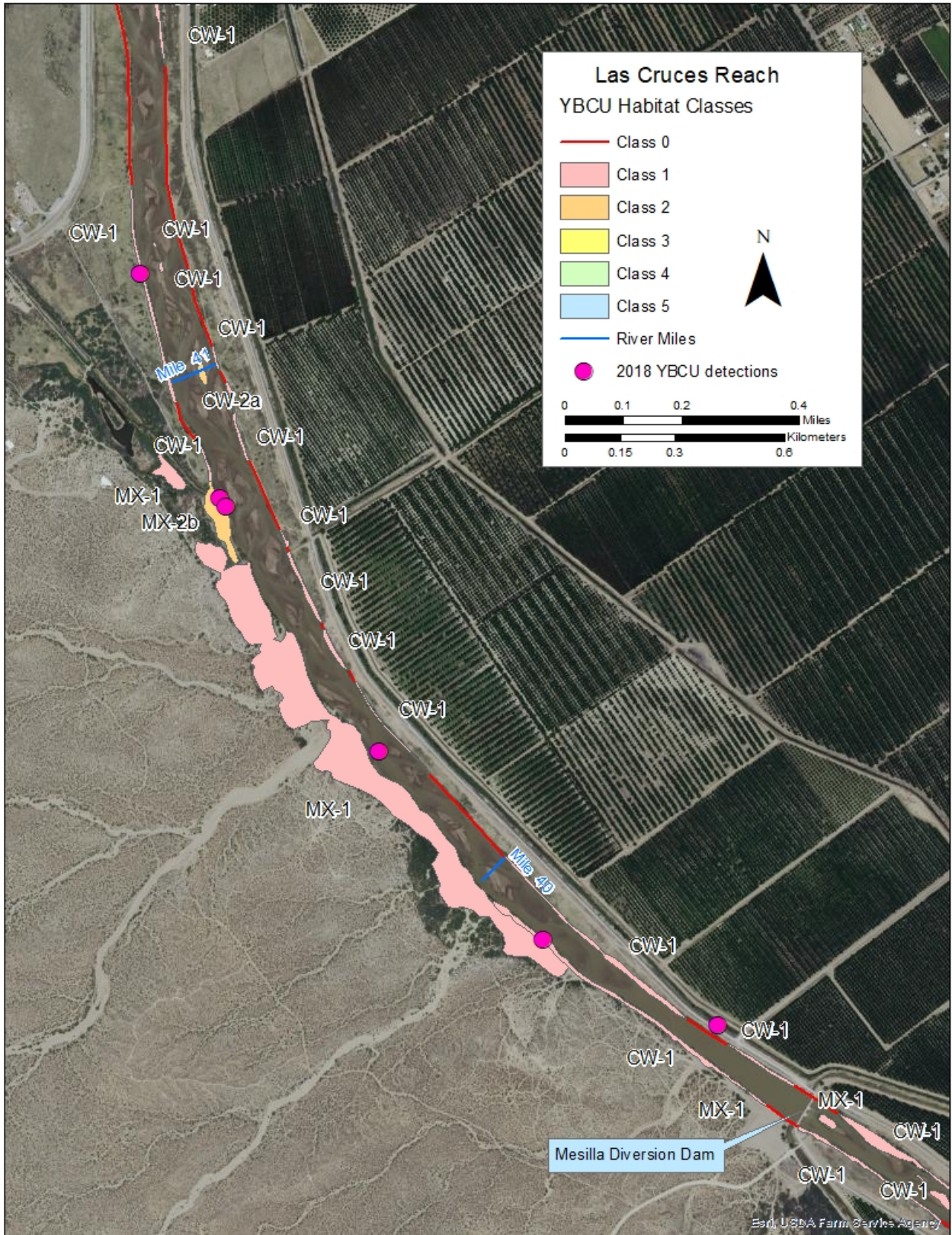


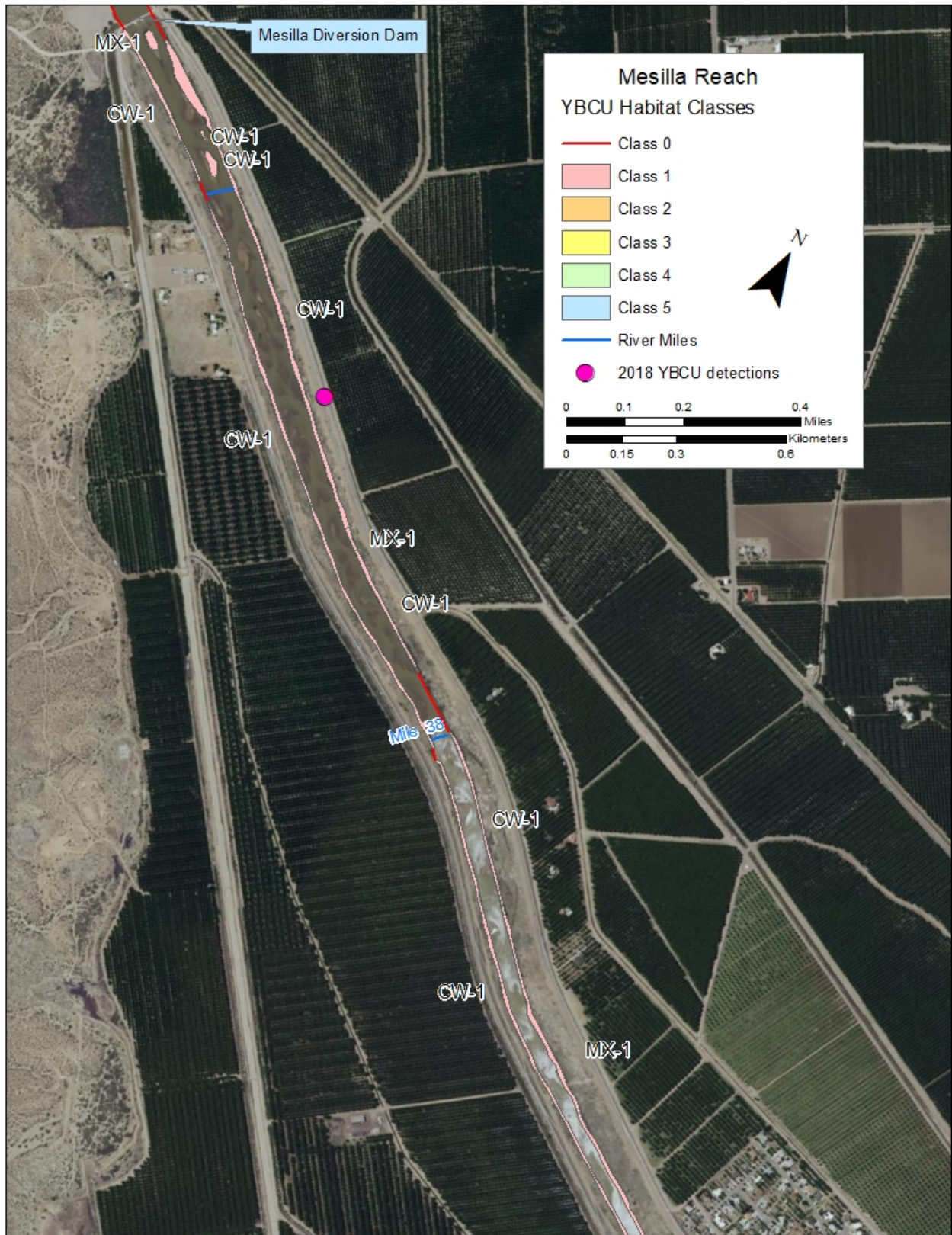


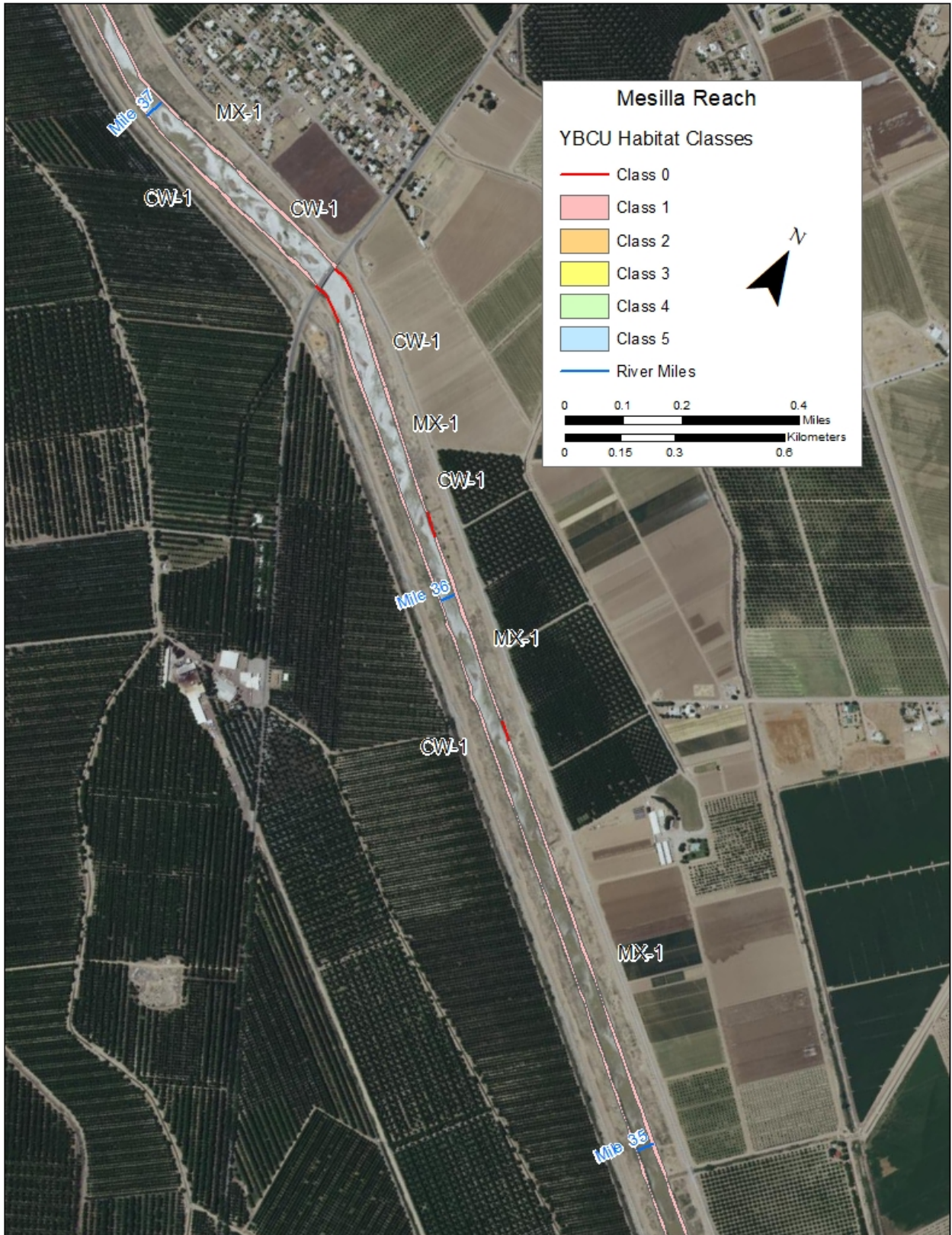


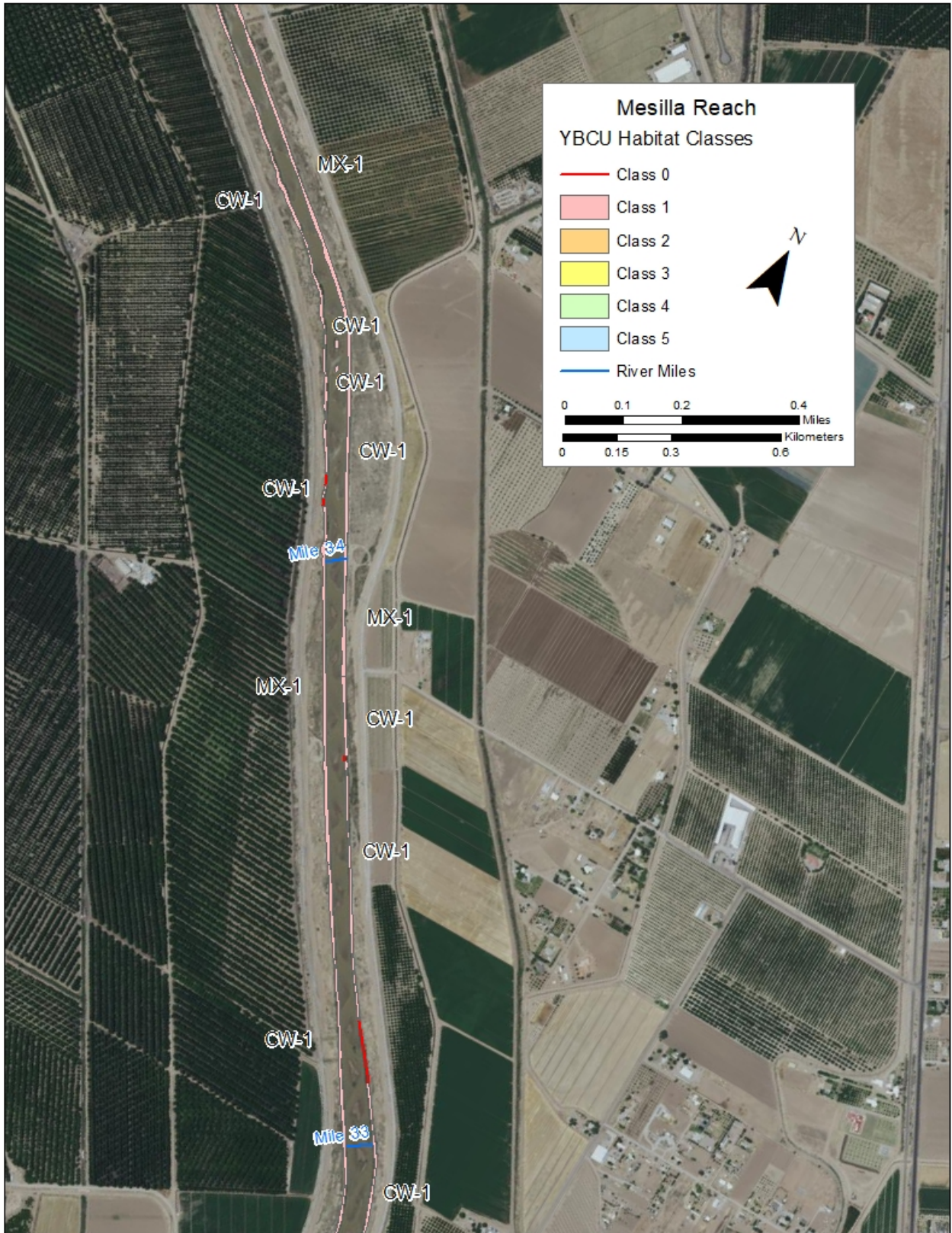


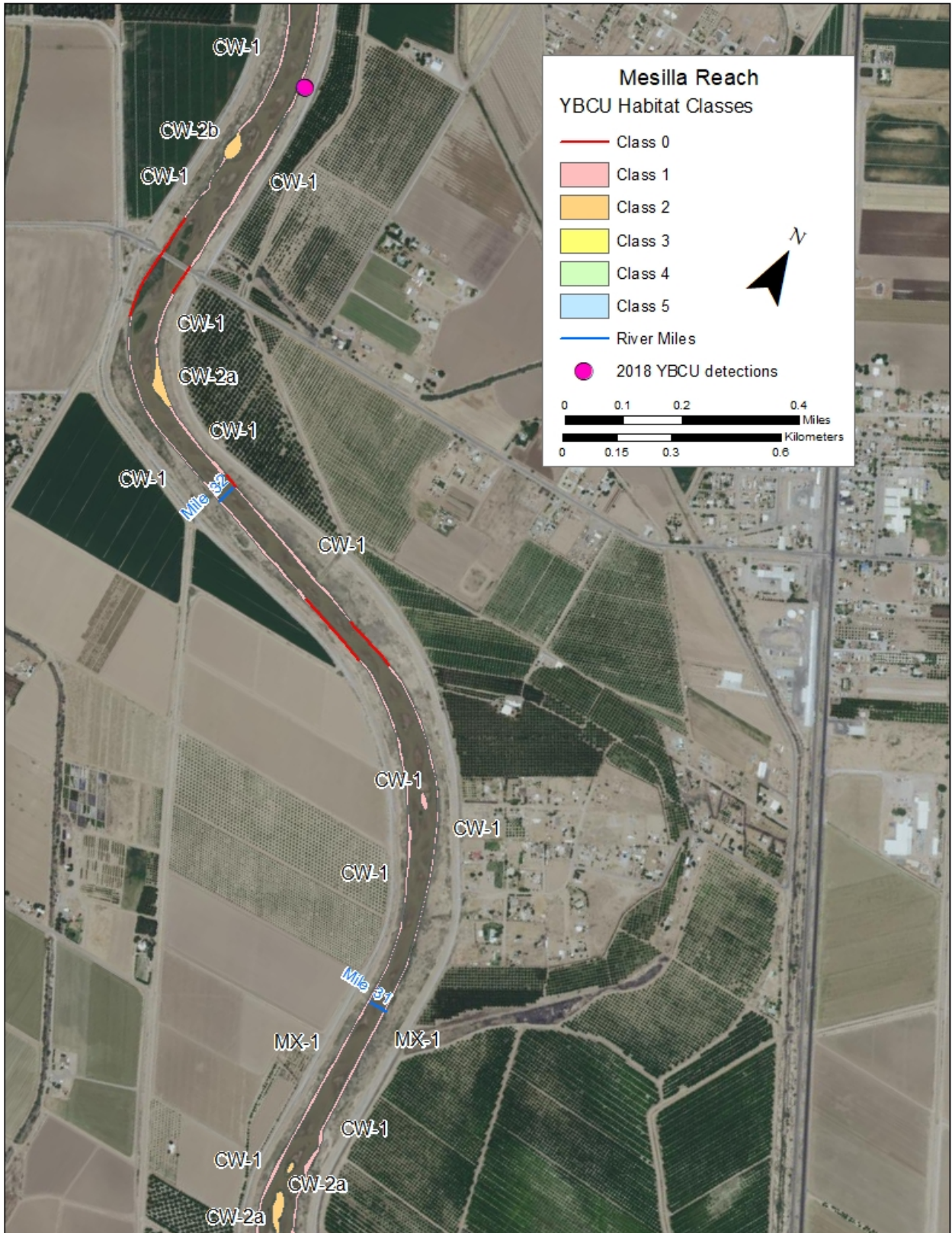


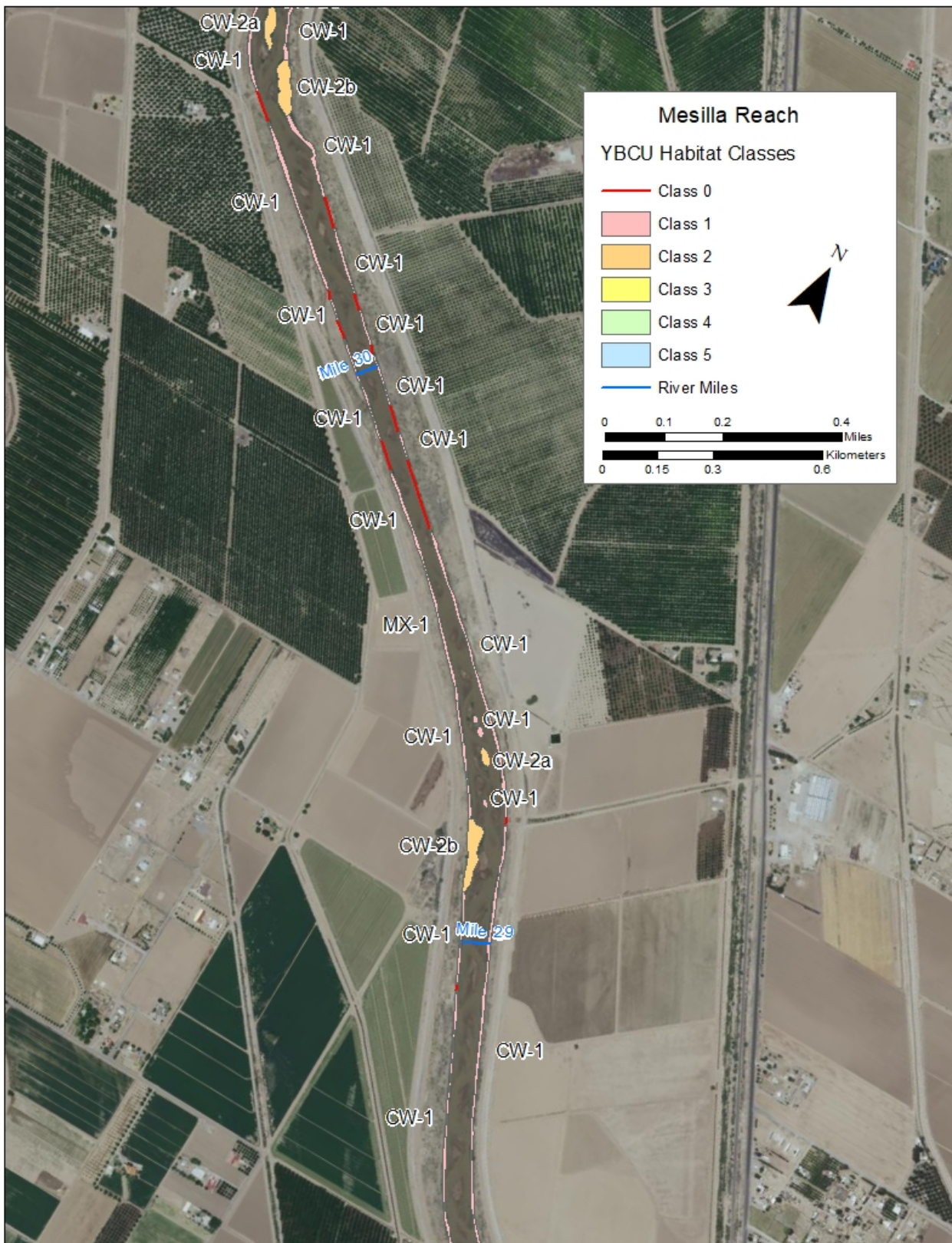


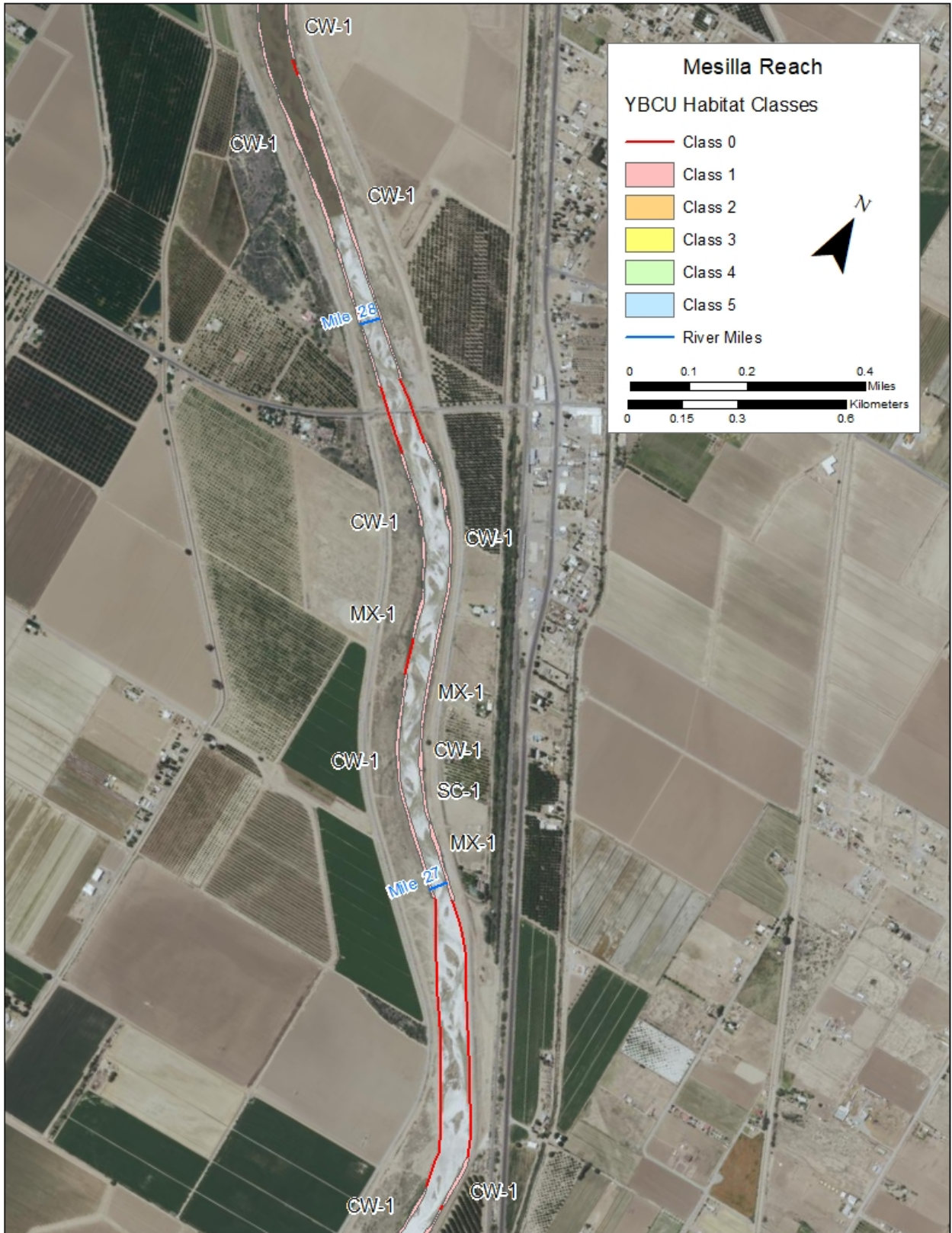


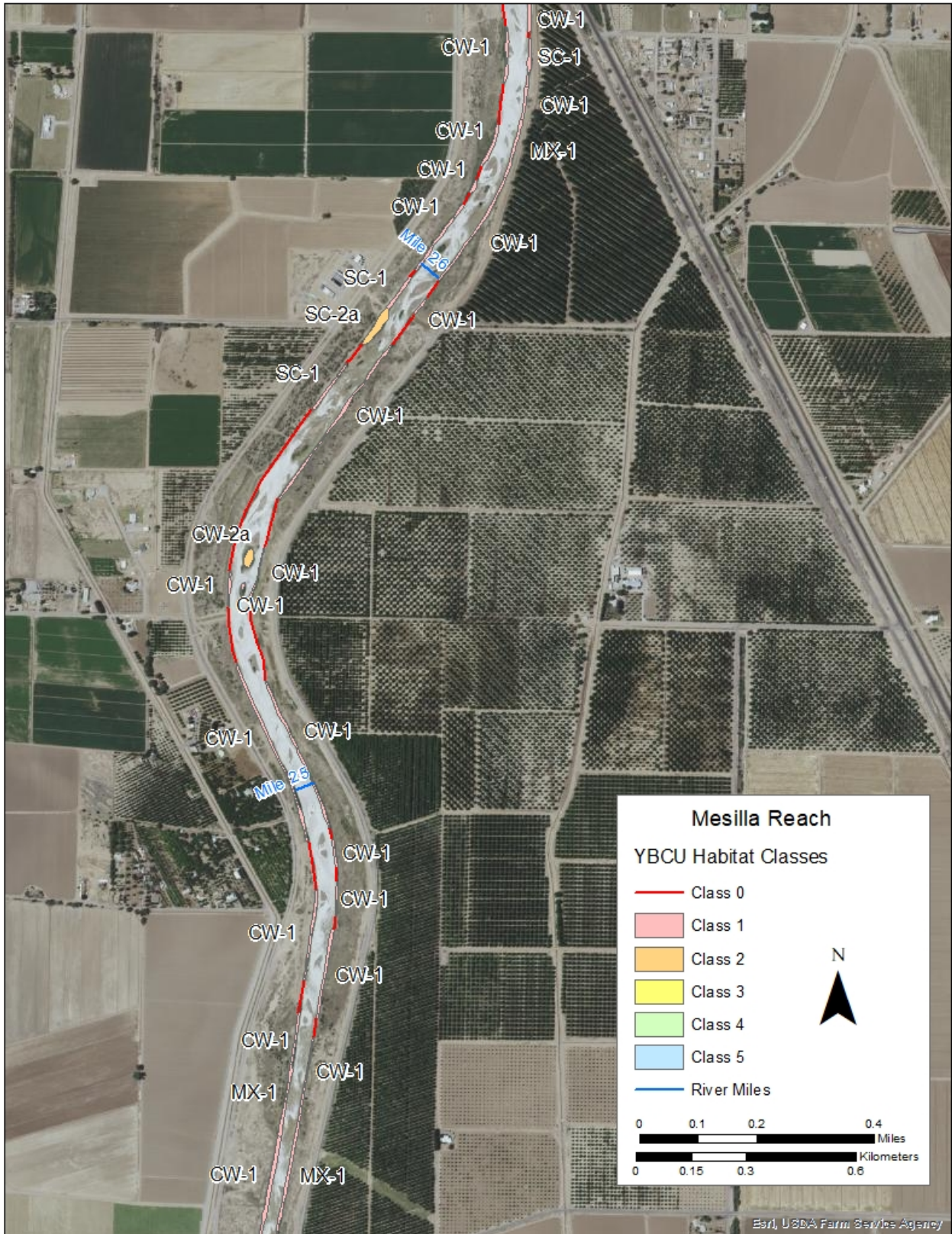


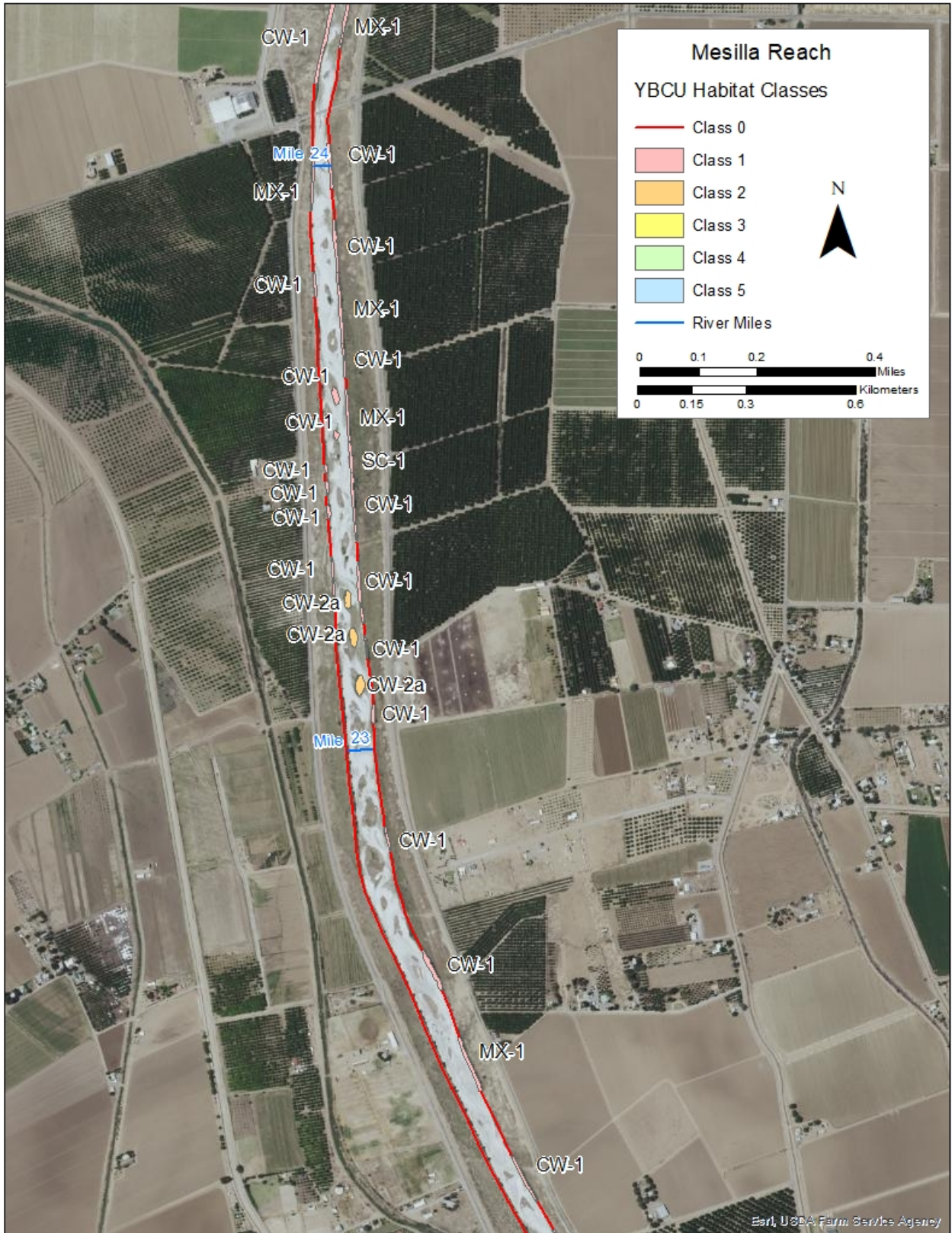


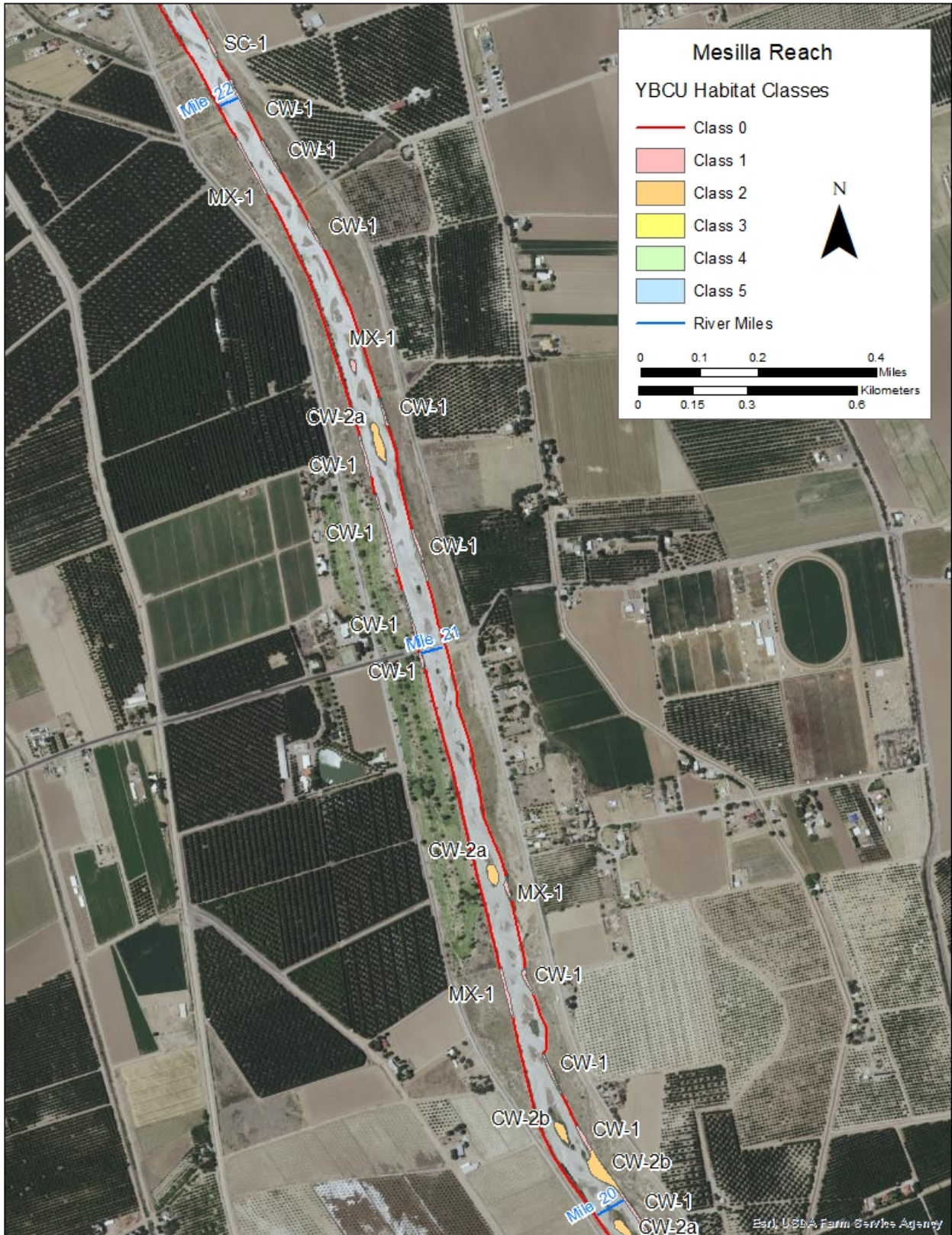


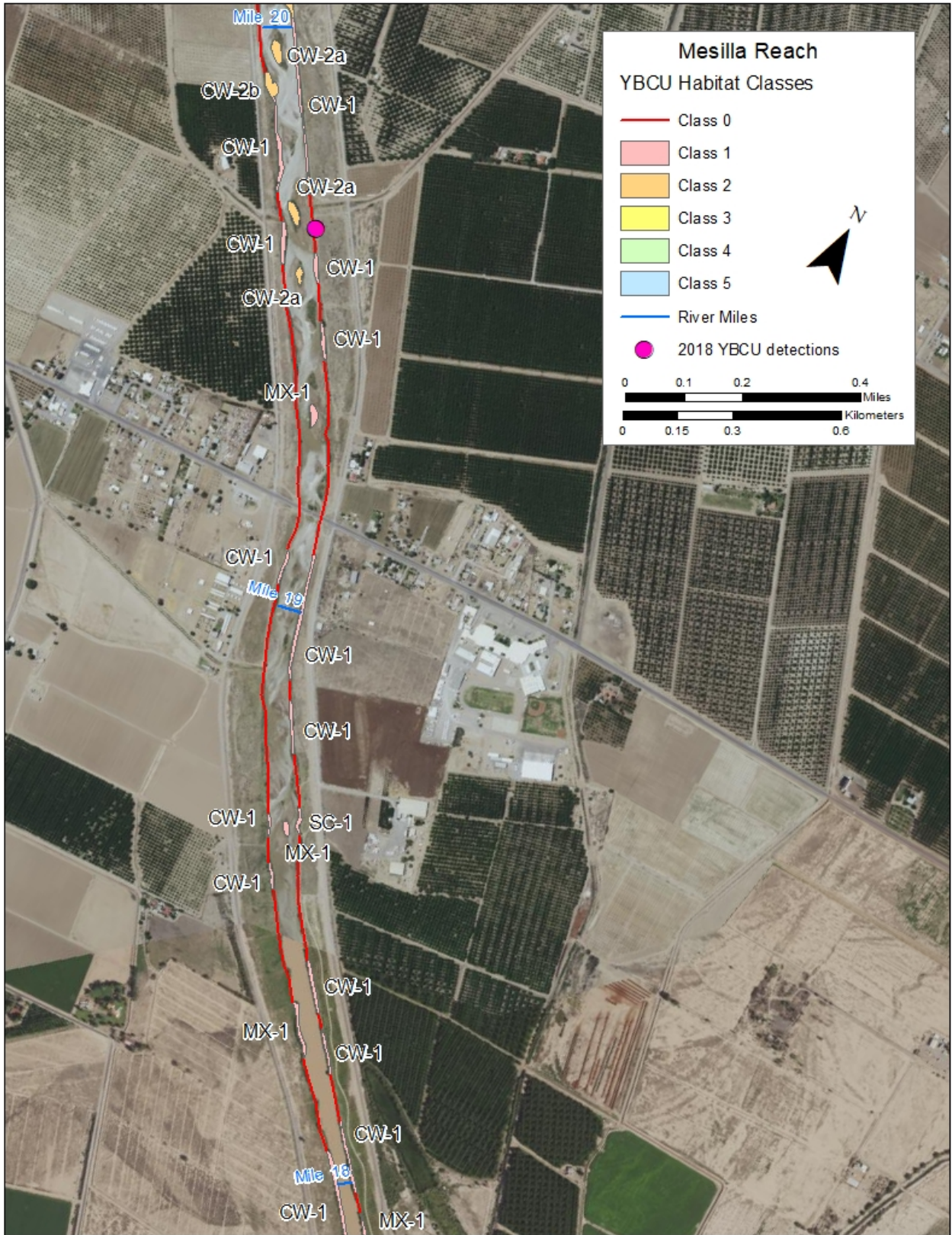


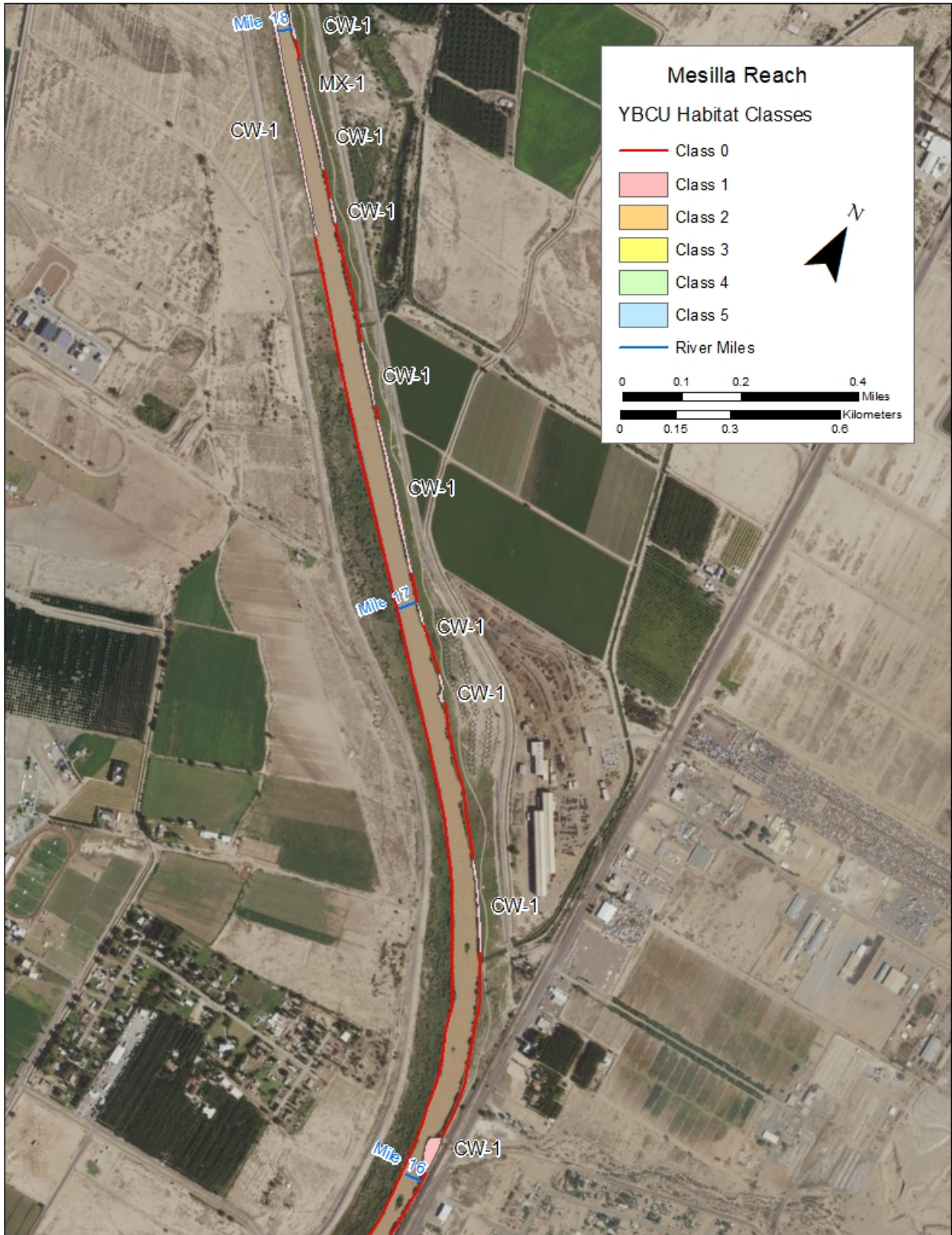


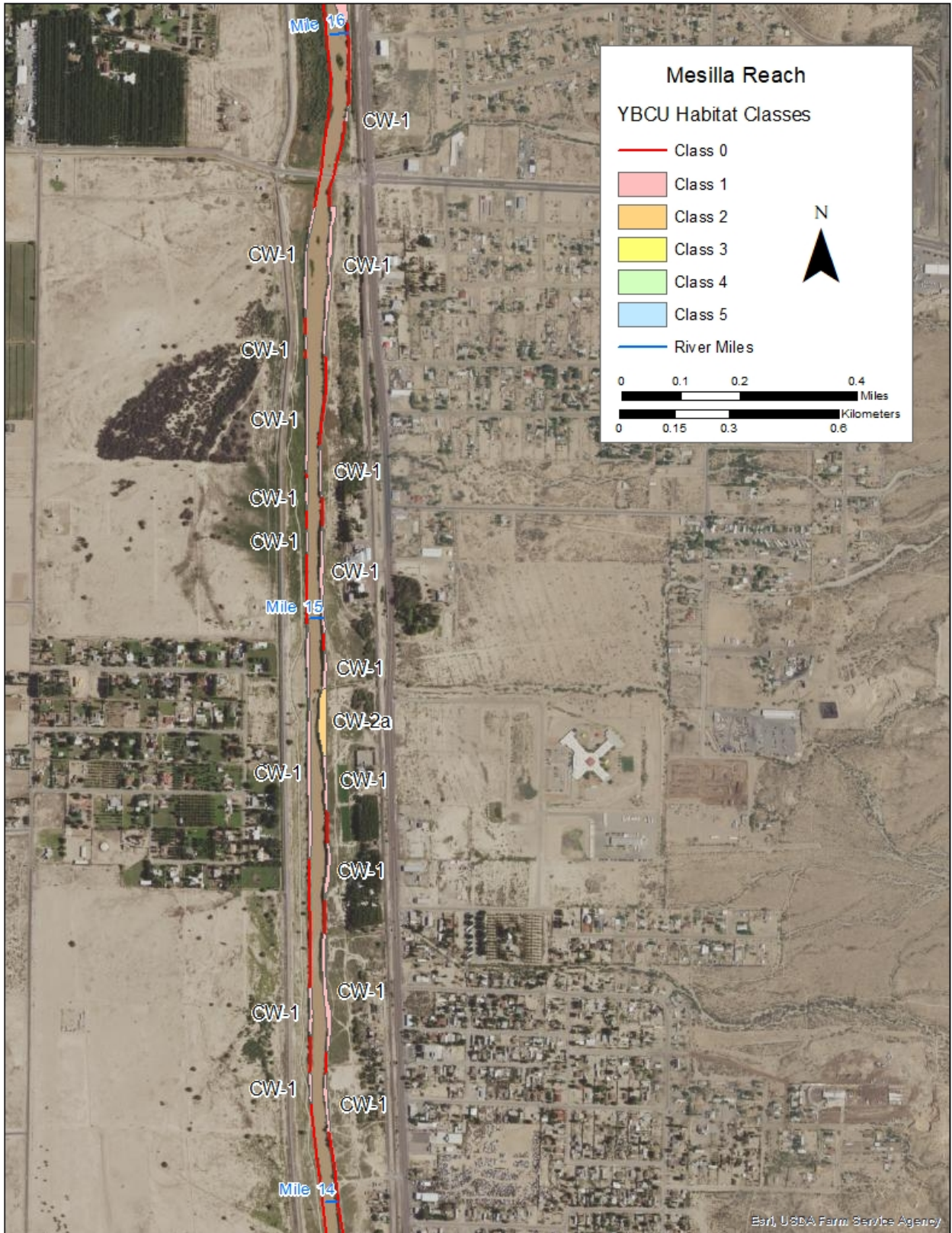


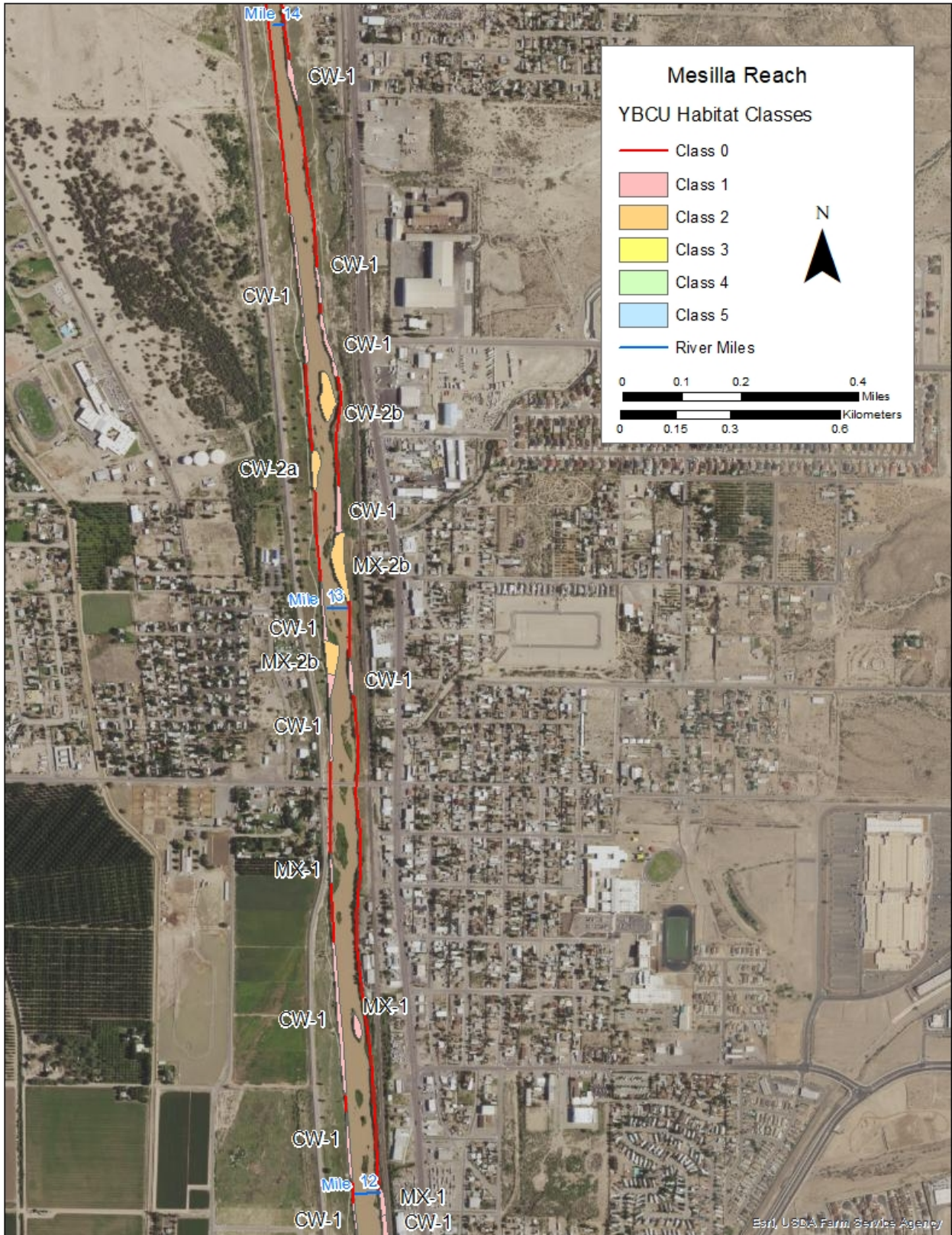


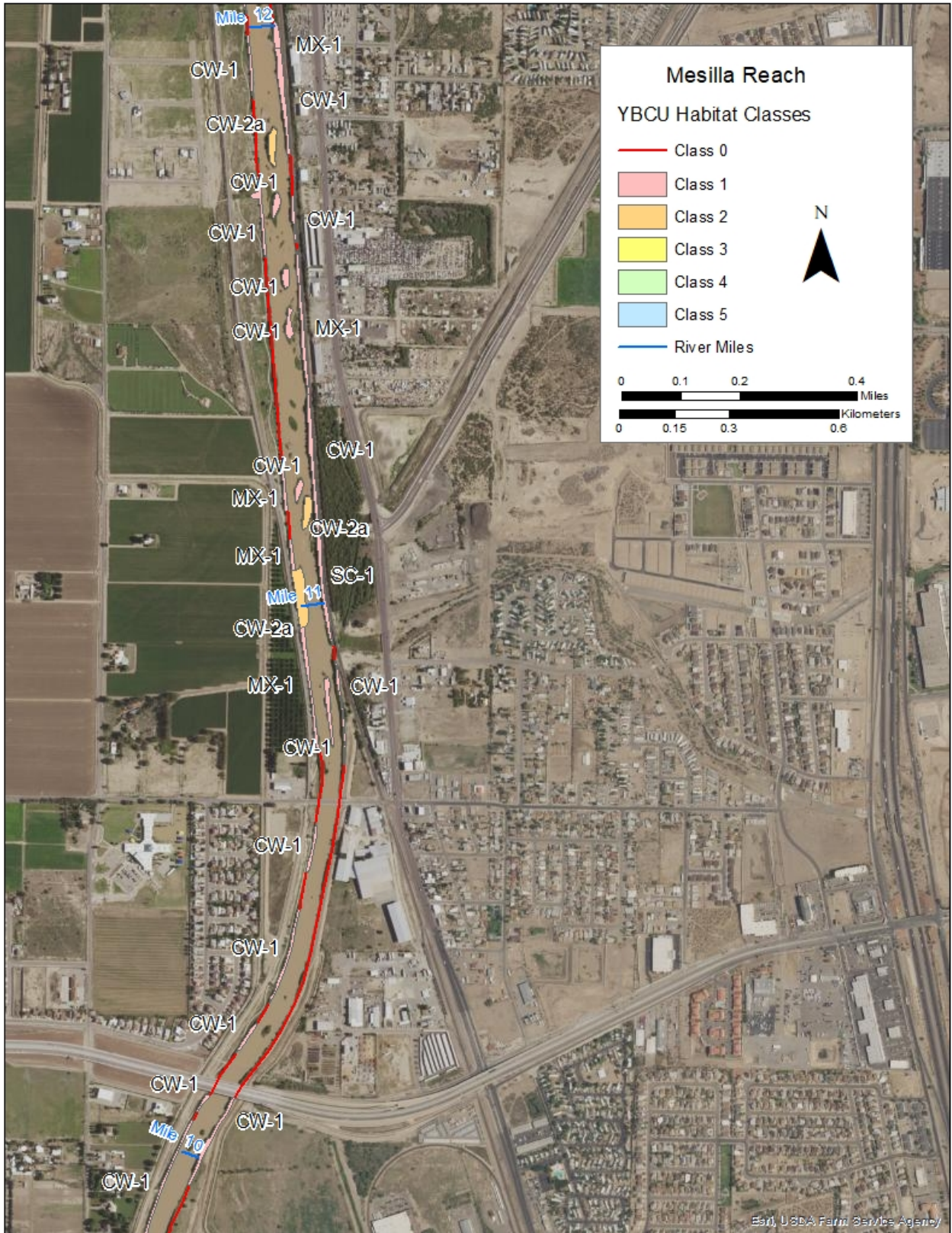


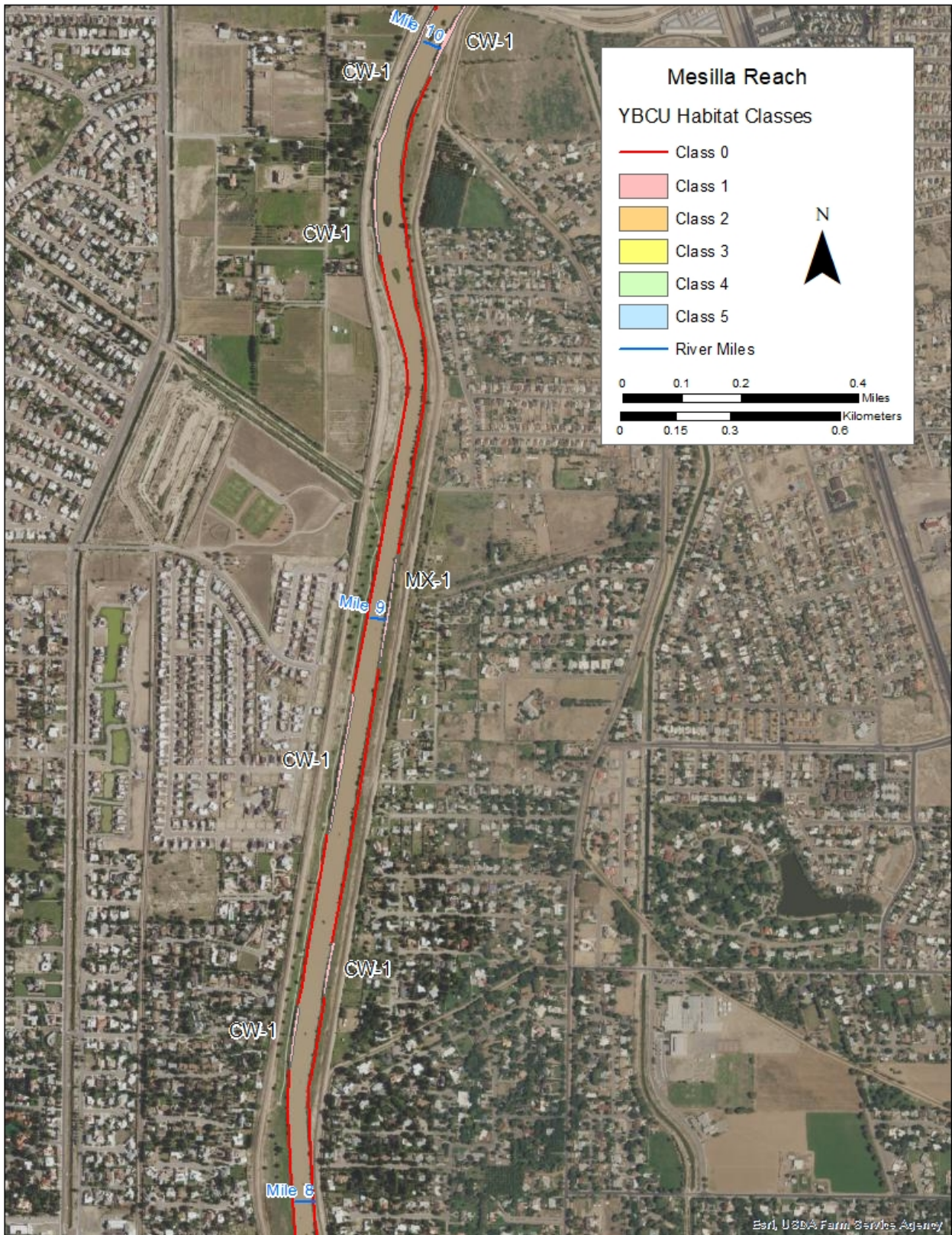


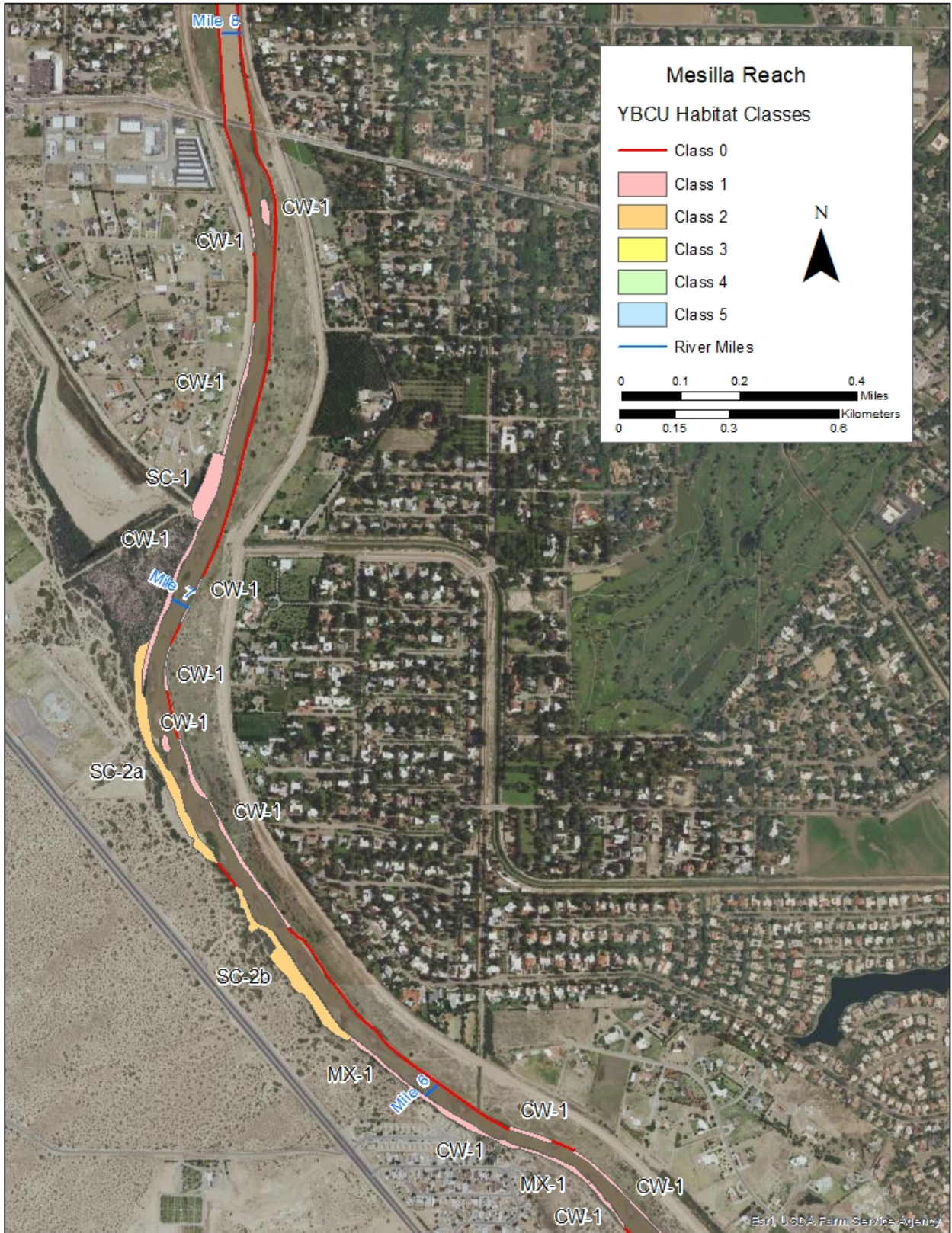


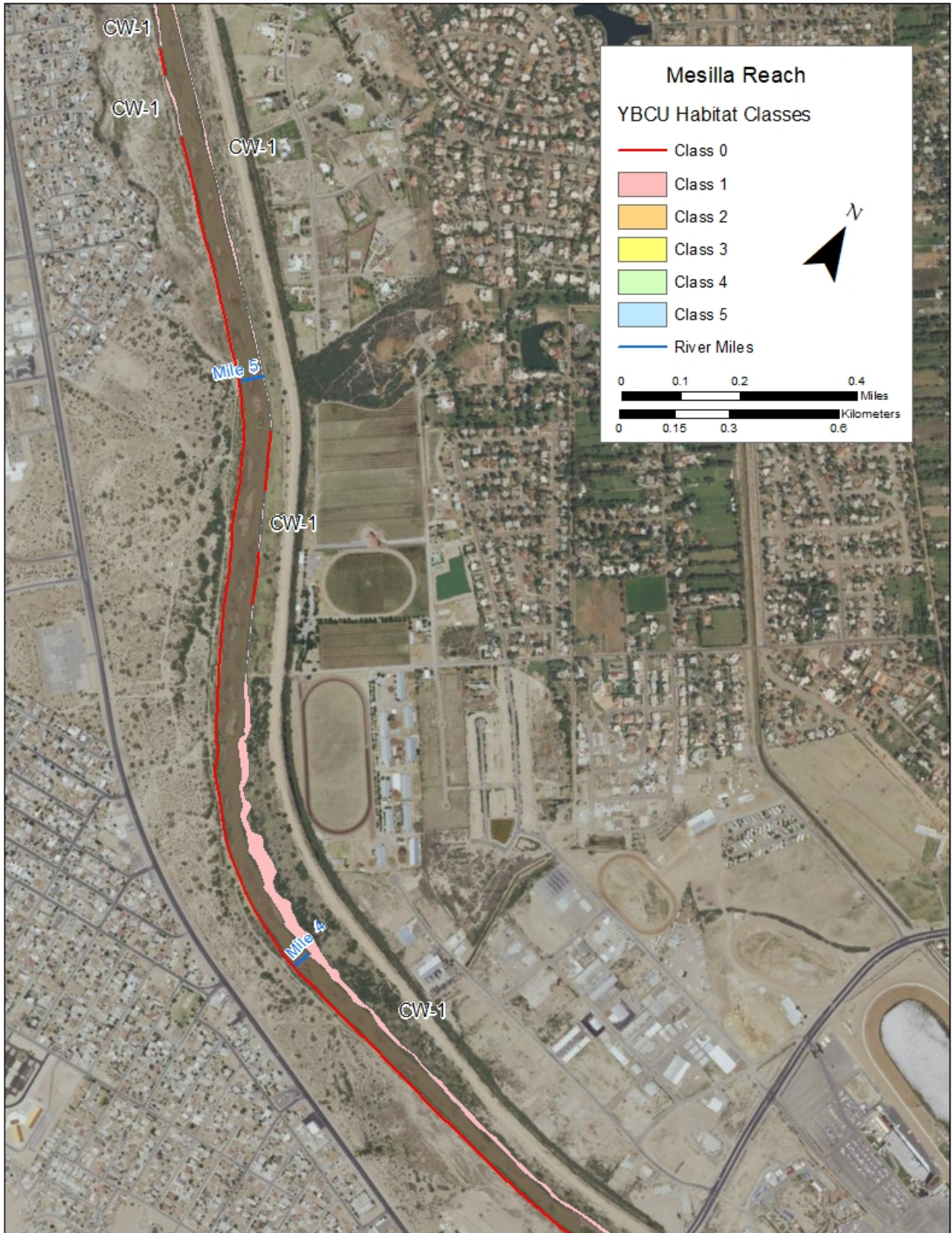


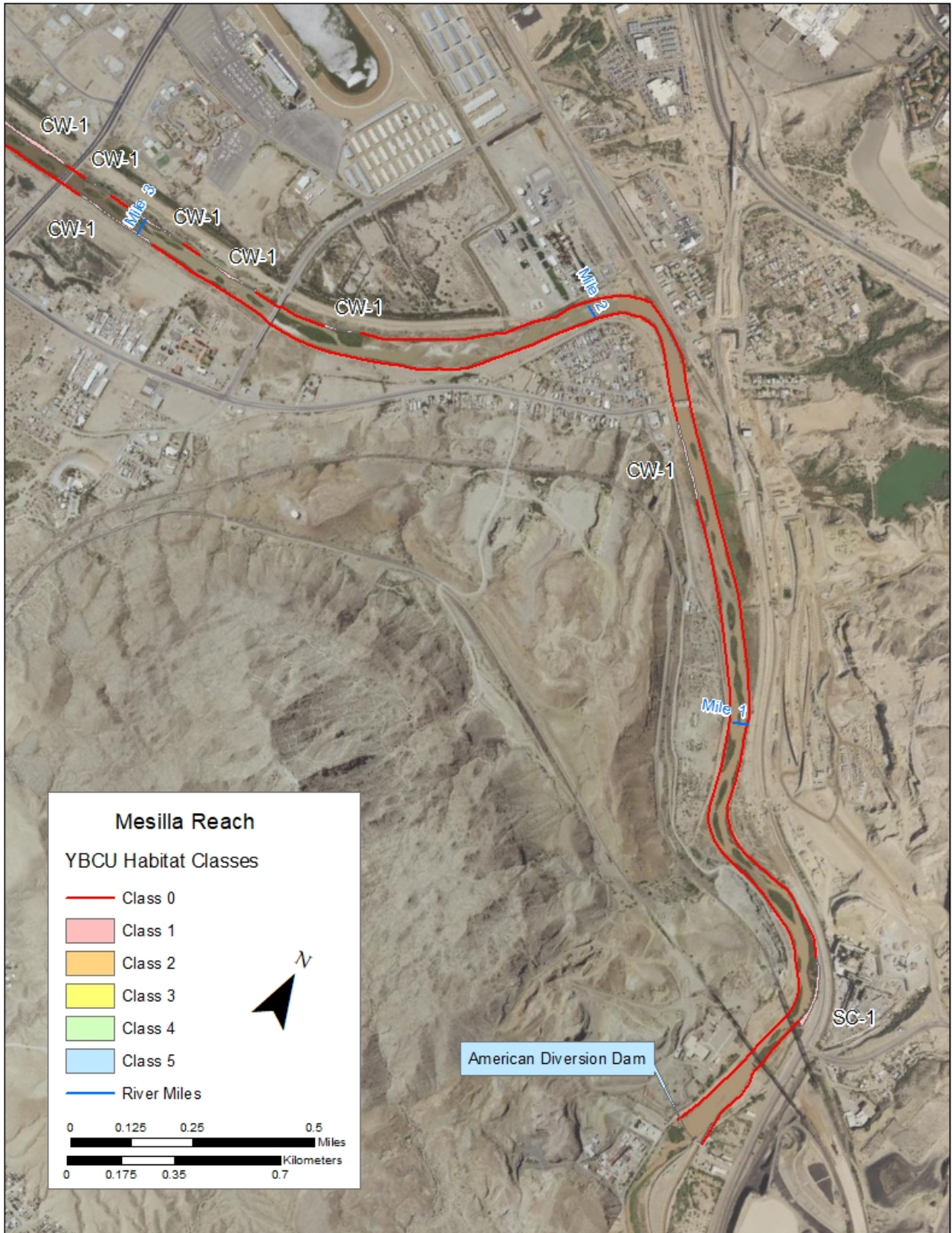












PEER REVIEW DOCUMENTATION

PROJECT AND DOCUMENT INFORMATION

Project Name LRG Yellow-billed Cuckoo Habitat Classification WOID FA727

Document Western Yellow-billed Cuckoo Habitat Classification 2018; Lower Rio Grande

Document Date April 2019

Team Leader Dave Moore

Document Author(s)/Preparer(s) Dave Moore, Rebecca Siegle

Peer Reviewer Kristen Dillon

REVIEW REQUIREMENT

Part A: Document Does Not Require Peer Review


Explain _____

Part B: Document Requires Peer Review: SCOPE OF PEER REVIEW

Peer Review restricted to the following Items/Section(s): _____ Reviewer: _____

REVIEW CERTIFICATION

Peer Reviewer - I have reviewed the assigned Items/Section(s) noted for the above document and believe them to be in accordance with the project requirements, standards of the profession, and Reclamation policy.

Reviewer: Kristen Dillon Review Date: March 2019 Signature: 

I have discussed the above document and review requirements with the Peer Reviewer and believe that this review is completed, and that the document will meet the requirements of the project.

Team Leader: Dave Moore Date: 4/9/2019 Signature: 