CONDITIONS AT POINT BUCKLER

RESPONSE TO CLEANUP AND ABATEMENT ORDER R2-2015-0038

October 16, 2015

APPLIED WATER RESOURCES

Conditions at Point Buckler

October 16, 2015

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1. INTRODUCTION

Applied Water Resources Corporation (AWR) has been retained by Point Buckler Club, LLC to provide a response to the Cleanup and Abatement Order No. R2-2015-0038 (Order) dated September 11, 2015 from the San Francisco Bay Regional Water Quality Control Board (Water Board) regarding Point Buckler Island. The Order requested a technical report providing a description of all levee and ditch repair activities, boat dock activities, and grading and/or vegetation removal activities performed at Point Buckler Island. This report responds to that request and is based primarily on information provided in aerial photographs, discussions with John Sweeney, and our site visit.

1.1 Definition of Terms

This report utilizes several terms that are specific to the conditions at Point Buckler, and defined as follows:

Channel = naturally developed depression in the topography that contains water, enables water to ebb and flow from the bay and/or ditch into and out of the Island's interior. These channels are typically dendritic and/or sinuous in morphology, and extend from the Island's edge or ditch towards the interior of the Island. For ease of discussion, channel includes linear drainage in the northeast portion of Island that connects the Island's largest channel to the ditch.

Island = Pt. Buckler, aka Annie Mason Island or Buckley Island.

Repaired ditch system = peripheral ditch constructed in 2014, as shown in its entirety in the April 2015 photo available on Google Earth.

Repaired levee system = peripheral levee constructed in 2014, as shown in its entirety in the April 2015 photo available on Google Earth.

Old ditch system = peripheral ditch as visible in the Google Earth June 2013 photo, with portions visible in the Google Earth photo dated May 2014. The extent of the old ditch system is limited to those reaches where land is located on both sides.

Old levee system = peripheral levee as shown in the 1984 aerial photo.

Pond = constructed depressions in the topography and appear as an arc-like shape in the April 2015 and more recent aerial photos.

Recent Activities = refers to activities conducted by the current owner to repair the levee and ditch systems.

Tidal Range = the data describing the tidal range at nearby Port Chicago is assumed to be similar to the tidal range at Pt Buckler. At Port Chicago, there is a 4.4 feet difference between MLLW and MHW.

1.2 Aerial Photos

The following lists and describes the aerial photos utilized to perform the assessment of the Island conditions reported herein.

Aerial Photo	Source	Type	Tide Level	Used in Calculations	Resolution	Description and Utility
1984	DOD	B&W	unclear	Yes	~1m x 1m	Depicts the location of the old levee prior establishing create a water tight system, per 1984 Island Management Plan. Used to map the location of the old levee system
2011	USGS	color	~ < mean	Yes	0.3m x 0.3m	Depicts Island conditions prior to any recent repair activities. Used to interpret conditions of the old ditch and old levee in the north central margin of the Island
5/12	GEarth	color	~ mean	No		Depicts Island conditions after acquisition by the current owner and before significant activities to repair the ditch and levee systems
8/12			~ low	No		
2013	NOAA	Infra-red	MLLW	Yes	0.5m x 0.5m	Depicts the extent of water in the Island at MLLW just prior to activities to repair the ditch and levee systems
2013	NOAA	Infra-red	MHW	Yes	0.5m x 0.5m	Depicts the extent of water in the Island at MHW just prior to recent activities.
1/13	GEarth	color	~ high	No		Depicts Island conditions after recent acquisition and before significant activities to repair the ditch and levee systems
4/13			~ mean	No		
6/13			~higher high	No		
5/14			~lower low	No		Depicts Island conditions after recent acquisition and during activities to repair the ditch and levee systems
8/14			~ low	No		
4/15			~ mean tide	Yes	~0.25m x 0.25m	Depicts current Island conditions following cessation of activities to repair the ditch and levee systems

~ = estimated tide level based on how much of the barge and pilings on southern Island margin is revealed and above water

2. Discussion of Activities

This section discusses the recent activities at the Island. Locations of these activities are shown on Figure 1.

2.1 Levee Repair Activities

Levee repair activities occurred in 2014. The repaired levee system is approximately 4,730 feet in length and spoils from the excavation of the repaired ditch system were used for the repair. Approximately 58% of the repaired levee system is located in its historical location, while approximately 42% is located further inland to avoid filling in the bay. Approximately, 305 feet of the repaired levee system was located in the old ditch system's footprint.

The cross-section of the repaired levee system approximates the minimum height, width, and slope specifications required by the Suisun Marsh Management Program (SMMP). Mean lower low water (MLLW) is approximately 3.99 feet and mean high water (MHW) is 8.39 feet; all tidal datums were acquired from the nearest tide station at Port Chicago, CA. The MHW line is assumed to correlate with the top of the debris piled along the shoreline on the exterior side of the repaired levee system, and in many locations is visible on aerial photographs. The height of the repaired levee system above MHW was estimated by John Sweeney to be approximately 2.7 to 4.4 feet above MHW, while the width, from toe to toe, is estimated to range from approximately 20 to almost 50 feet based on aerial photographs.

2.2 Ditch System Repair and Pond Excavation

In an aerial photograph from 2013, it appears that approximately 4,200 linear feet of the old ditch system remained on the Island, of which approximately 54% appears to be open to tidal influence, while approximately 46% appears to have been silted in.

Ditch repair activities occurred at the same time as levee repair activities because spoils were used to repair the levee system. A functional 24-inch floodgate was found in the southwest portion of the Island and was replaced with new flaps on each end to allow for water to enter the ditch system. Two 24-inch diameter steel pipe culverts were also installed to allow for water circulation on the Island.

The repaired ditch system is approximately 4,380 linear feet and John Sweeney indicated that efforts were made to locate the repaired ditch system within the old ditch system's footprint where possible. Where the repaired ditch system was located in the old ditch system's footprint, the margins of the old ditch system were widened and deepened.

As measured on a 2015 aerial photograph, the repaired ditch system ranges from approximately 10 to 30 feet wide, approximately 1,405 linear feet was placed within the old ditch system's footprint, and approximately 2,975 linear feet was moved inland. Mr. Sweeney measured the depth and found that the repaired ditch system had an average depth of 6 feet bgs.

Two arc-like shaped ponds were dug in late 2014 and two more were in the process of being dug at the Island when work was stopped prior to completion. The two completed ponds are approximately 4-5 feet deep.

2.3 Vegetation Disturbance or Removal Activities

Activities resulting in disturbed vegetation consisted largely of rotary mowing and movement of track mounted and rubber tired vehicles. In 2012, mowing activities commenced on portions of the Island to allow equipment to be placed onto the Island. Mowing activities occurred in the west, north, and southeastern portions of the Island. Track-mounted machines and rubber tired vehicles also moved across the Island to access various sections. In aerial photographs from 2014, vegetation reappears in a majority of the areas where the 2012 activities occurred. A path that provides access to the western section of the Island from the east was created by driving back and forth using various equipment and trucks in 2014.

Activities involving removal of vegetation occurred in 2014 and consisted of excavation for the repaired ditch system and ponds, and covering vegetation with the repaired levee system.

2.4 Boat Dock Activities

In September 2011, BCDC requested John Sweeney to allow the storage of docks owned by Salt River Construction at Chipps Island until they could be disposed of properly. In winter of 2013, approximately 335 feet of the docks broke loose and it was requested by California State Lands Commission (CA-SLC) that the docks be towed to and placed at Point Buckler Island. The docks were secured by lashing them to existing wood piers and a gangway was attached to the docks in order to connect to a walkway that allows access to the island. In October 2014, Mr. Sweeney was issued a lease for the docks from CA-SLC.

3. Evaluation and Comparison of Current Conditions

3.1 Placement of fill material into waters of the State

Recent activities at the Island has resulted in the placement of fill material into waters of the State. This work involved the repair the Island's levee system, which placed earthen materials into limited sections of the old ditch system and channels. The amount of fill material that was

placed into waters of the State was estimated by assuming waters of the State extend up to MHW, and using the following information and assumptions:

Section Type	Extent of Water		Area of Fill	Thickness of Fill	Fill Volume
	Condition	Photo	Photo	(feet)	cubic yards
Old ditch system	water present at MHW and MLLW	2013 NOAA	GEarth 4/2015	5.4 ft = full tidal range + 1 ft	106
	water present at MHW but not at MLLW			2.0 ft = half the tidal range	274
	water not present at MHW and MLLW			0 ft	0
Channel	water present at MHW and MLLW			5.4 ft = full tidal range + 1 ft	90
	water present at MHW but not at MLLW			2.0 ft = half the tidal range	30
	water not present at MHW and MLLW			0 ft	0
Total Estimated Volume of Fill					500

Figure 2 depicts the extent of water present in the old ditch system at MLLW and MHW. Figure 3 depicts the extent of water present in the channels at MLLW and MHW. Figure 4 depicts the areas where fill materials were placed into waters of the State.

The area of fill was identified by overlaying the aerial photos showing the extent of water (2013 NOAA photos) and the current conditions (2015 GEarth). Areas where the extent of water in old ditch system and channel are co-located with fill used to repair the levee system are considered the area where fill was placed into waters of the State. The thickness of fill is assumed to be the full tidal range plus 1 foot in areas where water is present at both MHW and MLLW. The thickness of fill is assumed to be at half the tidal range in areas where the old ditch system and channel appear to have water at MHW but have no water at MLLW. The calculation of the volume of fill material placed into waters of the State is simply the product of multiplying the area by the thickness.

The NOAA 2013 photos reveal reaches of the old ditch system where no water appears to be present at MHW and MLLW, such as along the eastern margin of the Island. It appears that these areas silted in over time, and based on the 2011 and 2013 aerial photos many of the areas appear to be vegetated. Consequently, in areas where the repaired levee system overlies these silted in portions of the old ditch system, no fill was introduced to waters of the State.

3.2 Acreage of all channel, marsh, or other wetland vegetation removed or otherwise adversely impacted at the Site

No determination of the extent of wetland and tidal marsh vegetation on the Island has been made. This section addresses the removal of all vegetation. Recent activities at the Island has resulted in the removal or coverage of vegetation. Removal of vegetation is considered to be the result of excavation or coverage by fill materials. For the repair of the ditch system and creation of the ponds, this work involved excavation, which removed vegetation. For the repair of the levee system, this work involved adding fill material, which covered vegetation.

In some areas the repaired levee system incorporated, or coincides with, the old ditch system and channels. No significant vegetation is assumed to have been located within those portions of the old ditch system and channels that contain water at MHW per the NOAA 2013 photo. Therefore, no vegetation was removed from those portions of the old ditch system and channels that contained water at MHW and also coincide with the limits of the current repaired levee system. Vegetation is considered to have been removed where the repaired ditch system extends into areas that were not previously ditch or levee, as shown on Figure 5.

Per conversation with John Sweeney, approximately 50% of the area of the old levee system was covered with vegetation, therefore 50% of the area of coincidence of old levee system and repaired levee system is interpreted to be removed vegetation. Vegetation is also interpreted to have been removed where the repaired levee system is located on areas of the Island that were not previously ditch or levee, as shown on Figure 6.

Similarly, the new ponds incorporated, or coincide with channels. No vegetation is interpreted to have been removed where the channels and ponds coincide. Vegetation is considered to have been removed where the ponds extend into areas without channels, as shown on Figure 5.

Based on the above, the tables below summarize the acreage of vegetation removed:

Acreage of vegetation removed by repaired ditch system:

Repaired ditch system	2.07
Old ditch system containing no vegetation and coinciding with repaired ditch system	0.10
Old levee system containing no vegetation and coinciding with repaired ditch system	0.02
Channels containing no vegetation and coinciding with repaired ditch system	0.02
Total area of vegetation removed	1.93 acres

Acreage of vegetation covered by repaired levee system

Repaired levee system	2.89
Old ditch system containing no vegetation and coinciding with repaired levee system	0.10
Old levee system containing no vegetation and coinciding with repaired levee system	0.19
Channels containing no vegetation and coinciding with levee ditch system	0.02
Total area of vegetation covered	2.58 acres

Acreage of vegetation removed by ponds

Ponds	0.19
Old ditch system containing no vegetation and coinciding with ponds	0.01
Total area of vegetation removed	0.18 acres

There are other areas on the Island where vegetation has been disturbed, but not in a manner causing permanent removal by excavation or coverage. These areas consist of roads and paths created by machinery. For example, the 2012 aerial photograph shows various areas of disturbed vegetation that are no longer visible on the 2015 photograph, which show that vegetation recovers in these disturbed areas. Consequently, areas of vegetation disturbance are not included in the estimation of the area of vegetation removed.

3.3 Linear distance (in feet) of channels impacted by the levee repair activities

Prior to the recent repair of the levee and ditch systems, there was approximately 4,200 feet of old ditch system that was bounded on both sides by land. Of this, approximately 601 feet of the old ditch system contained water at MLLW and 2,321 feet of the old ditch system contained water at MHW, per the 2013 NOAA photos.

Biologists consider the wetted edge of a channel to provide potential habitat and nutrient exchange between ground water and surface water. Evaluated from the perspective of a wetted edge, approximately 1,203 feet of the old ditch system provided a wetted edge at MLLW and 4,642 feet of the old ditch system provided a wetted edge at MHW, per the 2013 NOAA photos. Recent activities at the Island have repaired the ditch system, which now consistently contains water all the time. As a result, the current length of the repaired ditch system is 4,380 feet, which provides approximately 9,058 feet of wetted edge.

A similar evaluation measured the length of the channels and wetted edge at MLLW and MHW in the 2013 NOAA photos, and under the current conditions. Finally, recent activities excavated four ponds, and two consistently contain water. The following table summarizes these measurements:

Section	Condition	Photo	Length (feet)	Wetted Edge (feet)
Channel	Old at MHW	2013 NOAA	4,478	8,956
	Old at MLLW	2013 NOAA	2,773	5,546
	Current	4/2015 GEarth	3,883	7,766
Ditch	Old at MHW	2013 NOAA	2,321	4,642
	Old at MLLW	2013 NOAA	601	1,203
	Current	4/2015 GEarth	4,380	9,058
Pond	Old	2013 NOAA	na	0
	Current	4/2015 GEarth	na	557

The total wetted edge of the channels and old ditch system in 2013 at MHW was 13,598 feet and at MLLW was 6,754 feet. For comparison, the total wetted edge of the channels and repaired ditch system in 2015 is 16,824 feet. The total length of the channels and old ditch system in 2013 at MHW was 6,799 feet and at MLLW was 3,374 feet. For comparison, the total wetted edge of the channels and repaired ditch system in 2015 is 8,263 feet.

Due to the presence of the repaired levee system and the single tide gate, the amount of tidal variation within the ditch, and correspondingly within the channels, has not yet been quantified. With the single currently installed tide gate closed, some tidal variation within the ditch is still likely, due to groundwater recharge and leakage through the levees. With the current tide gate open, additional tidal variation within the repaired ditch would occur. For the purposes of this report, tidal variation within the current ditch system is considered to be subdued and less than the conditions in old ditch system.

3.4 Description of the pre-disturbance tidal channel morphology, soil conditions, and hydrology

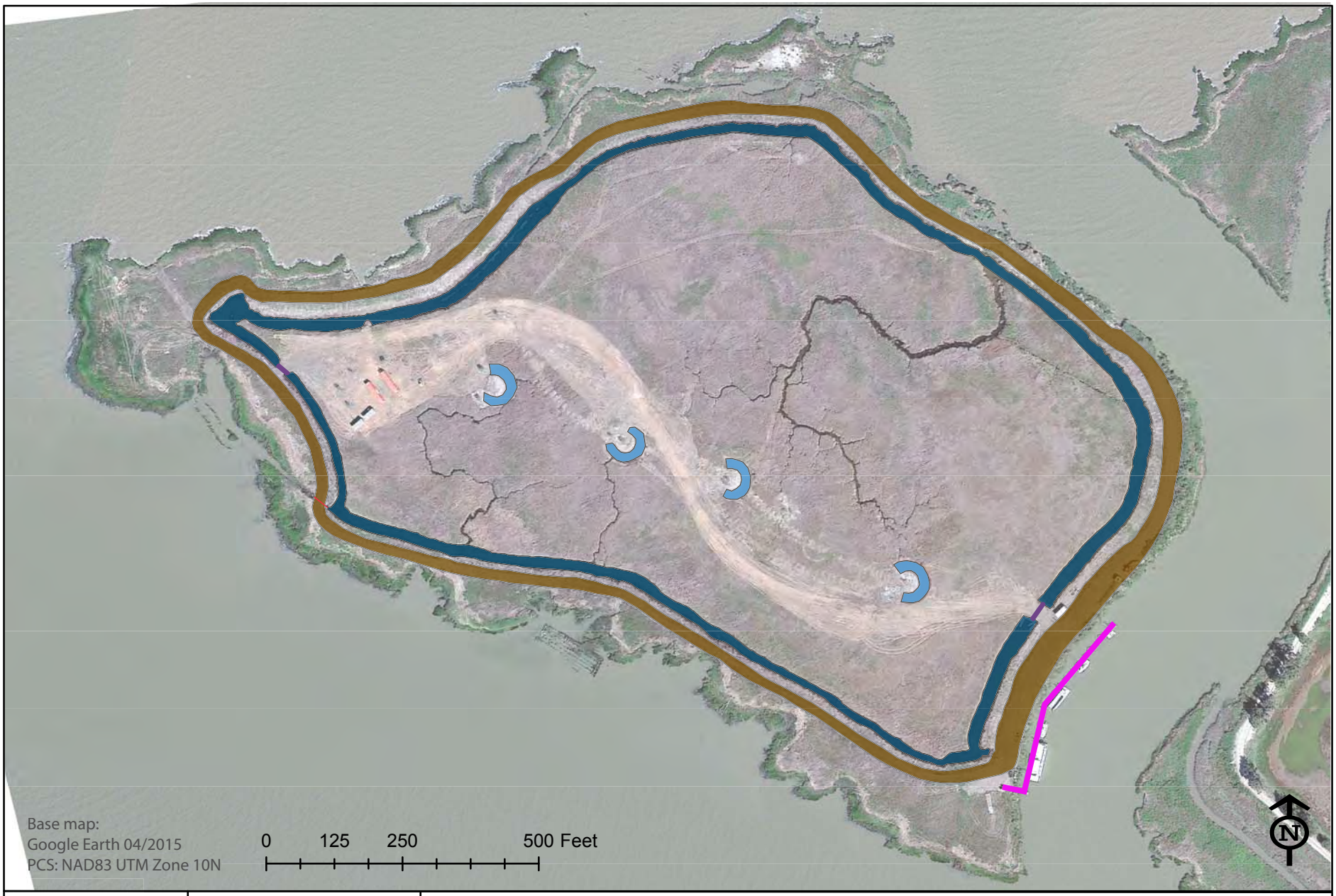
Channel morphology at the Island can be characterized by its overall length, length of wetted edge, width and cross-sectional area at mouth, dendritic structure (number of tributaries), and sinuosity ratio (length divided by linear distance between endpoints). Eight channels are visible on the aerial photographs, Figure 3. The following summarizes the conditions at MHW per the 2013 NOAA photo and prior to the activities that repaired the ditch and levee systems.

		Channels							
Parameter	Units	A	B	C	D	E	F	G	H
Length (primary at MHW)	ft	459	728	204	136	254	77	1,311	270
Length (system at MHW)	ft	527	804	204	136	298	145	2,094	270
Wetted Edge (system at MHW)	ft	1,054	1,608	408	272	596	290	4,188	540
Width (mouth)	ft	7.8	7.0	1.3	5.6	5.8	0.9	7.0	2.8
Depth	ft	5.4	5.4	2.0	2.0	2.0	2.0	5.4	5.4
Cross-section (mouth)	ft^2	42.1	37.8	2.6	11.2	11.6	1.8	37.8	15.1
Tributaries (secondary)	count	1	1	0	0	2	1	6	0
Sinuosity (ratio)	ft/ft	1.32	1.94	1.21	1.12	1.28	1.04	1.95	1.0

In 1975, the US Department of Agriculture Soil Conservation Service prepared a Soil and Capability Map Summary, which is included in the 1984 Individual Management Plan for the Annie Mason Point Club. This summary shows the soil type Joice Muck (Ja) present in the upper 60 inches throughout the interior of the Island and Tidal Marsh (Td) present along the periphery of the Island. The USCS describes Joice Muck as nearly level, very poorly drained mucks and peaty mucks, and Tidal Marsh as nearly level, somewhat poorly drained silt loams and silty clay loams on alluvial fans and in dredge spoil areas. No other evaluation of the soil types and distribution at the Island prior to the recent activities has been performed.

The hydrology of the Island prior to the recent repairs to the ditch and levee system consisted of tidally influenced portions of some channels and some old ditches. Eight channels are visible in the aerial photographs, including the manmade feature in the northeast portion of the Island, connecting the Channel G with the old ditch. Though no topographic survey is known to exist, the visit to the Island indicated that most of the Island is at least 2 to 4 feet above the surrounding bay at MHW. Consequently, while the largest Channel G extends almost 600 feet into the Island's interior and Channels A and B extend about 400 feet towards the interior, much of the island appears to not be subjected to inundation under normal tidal action. Rather, these channels appeared to be incised by a few feet into the surrounding land. This condition is also consistent with the observation of vehicle paths in the 2012 and 2013 aerial photographs, taken prior to the repairs of the levee and ditch system. Such travel by heavy machinery and rubber tired vehicles would not have been possible on saturated ground.

FIGURES



APPLIED WATER RESOURCES

Figure - 1

Locations of Recent Activities

Point Buckler, CA

- Repaired levee system
- Repaired ditch system
- Ponds
- Culverts
- Tide gate
- Dock activity

APPLIED WATER RESOURCES

Figure - 2

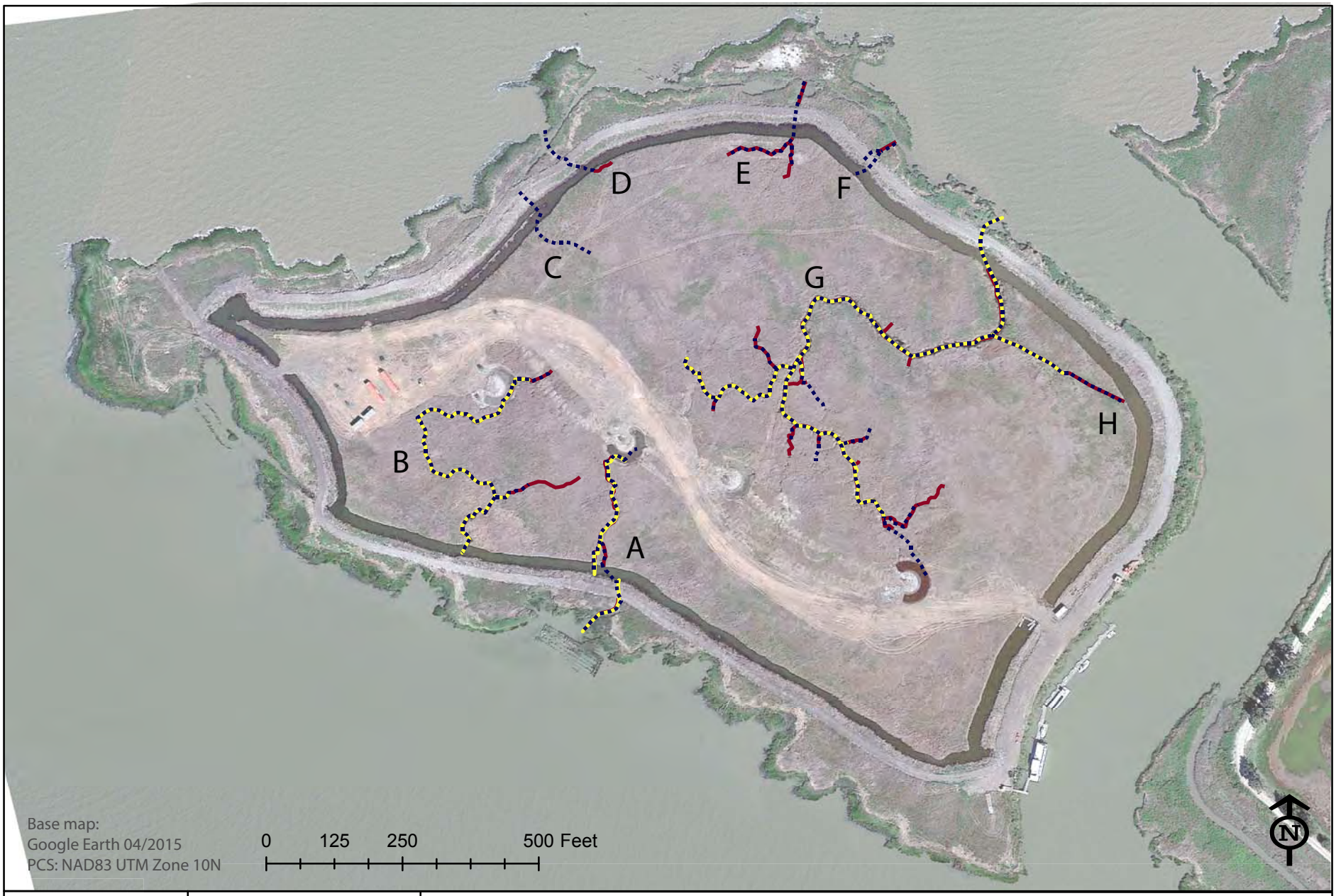
Extent of Water in Old Ditch System

Point Buckler, CA

Old levee system

Old ditch system with wetted edge at MHW

Old ditch system with wetted edge at MLLW



APPLIED WATER RESOURCES

Figure - 3

Extent of Water in Channels

Point Buckler, CA

Channels at MLLW in 2013

Channels at MHW in 2013

Channels in 2015

Note: Water in channels in 2015 includes extent of MLLW water in 2013

APPLIED WATER RESOURCES

Figure - 4

Areas of Fill Placed into Waters of the State

Point Buckler, CA

Filled Areas of water of the State

- Old ditch 5.4' deep
- Old ditch 2.0' deep
- Channel 5.4' deep
- Channel 2.0' deep

Other

- Repaired Levee System

APPLIED WATER RESOURCES

Figure - 6

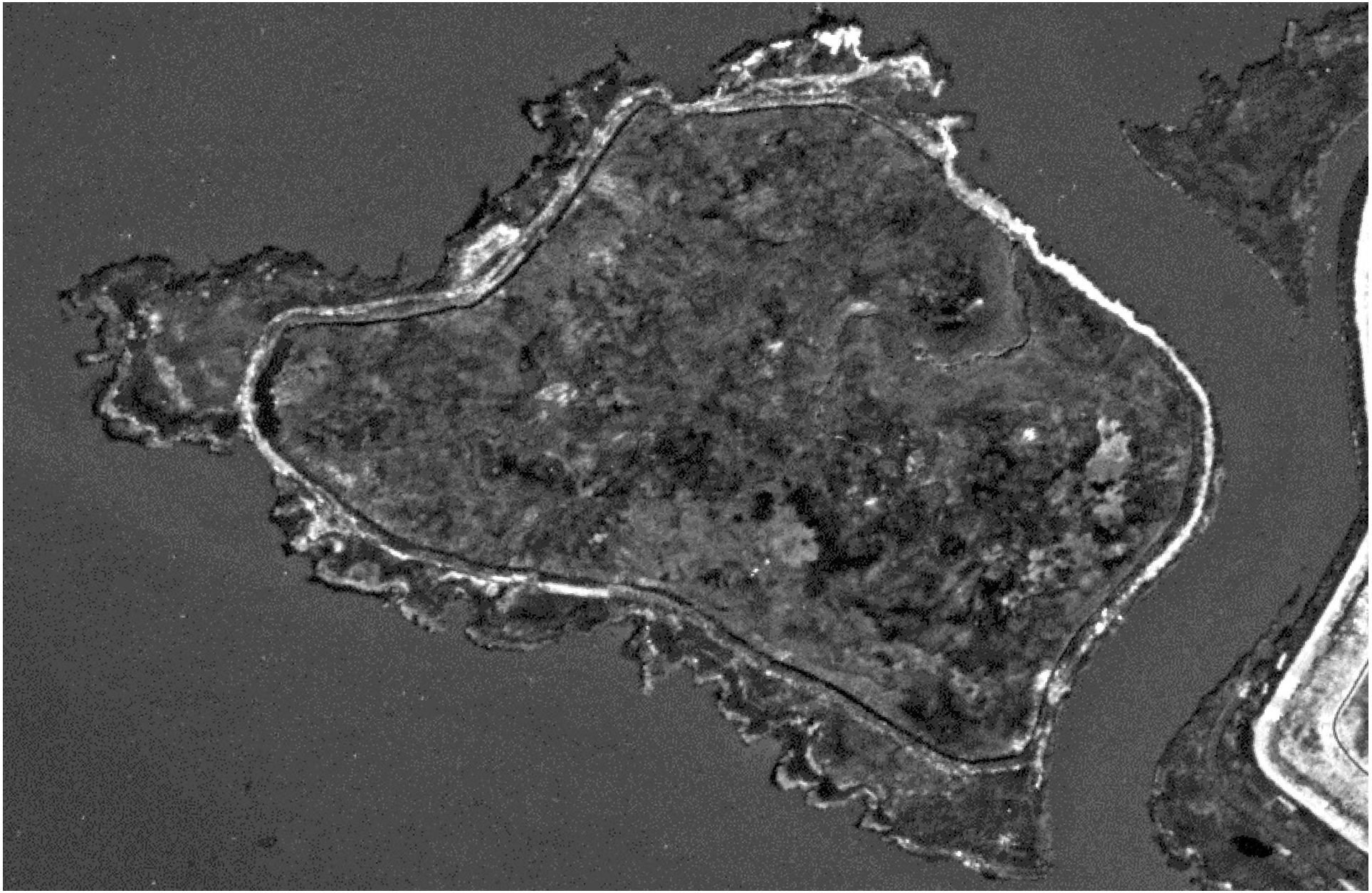
Areas of Covered Vegetation

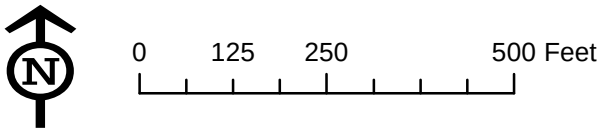
Point Buckler, CA

Area of repaired levee system

- Old levee with 50% vegetation
- 100% vegetation
- Channels without vegetation
- Old ditch without vegetation

APPENDIX A
AERIAL PHOTOGRAPHS – ORIGINAL WITHOUT MARKUP

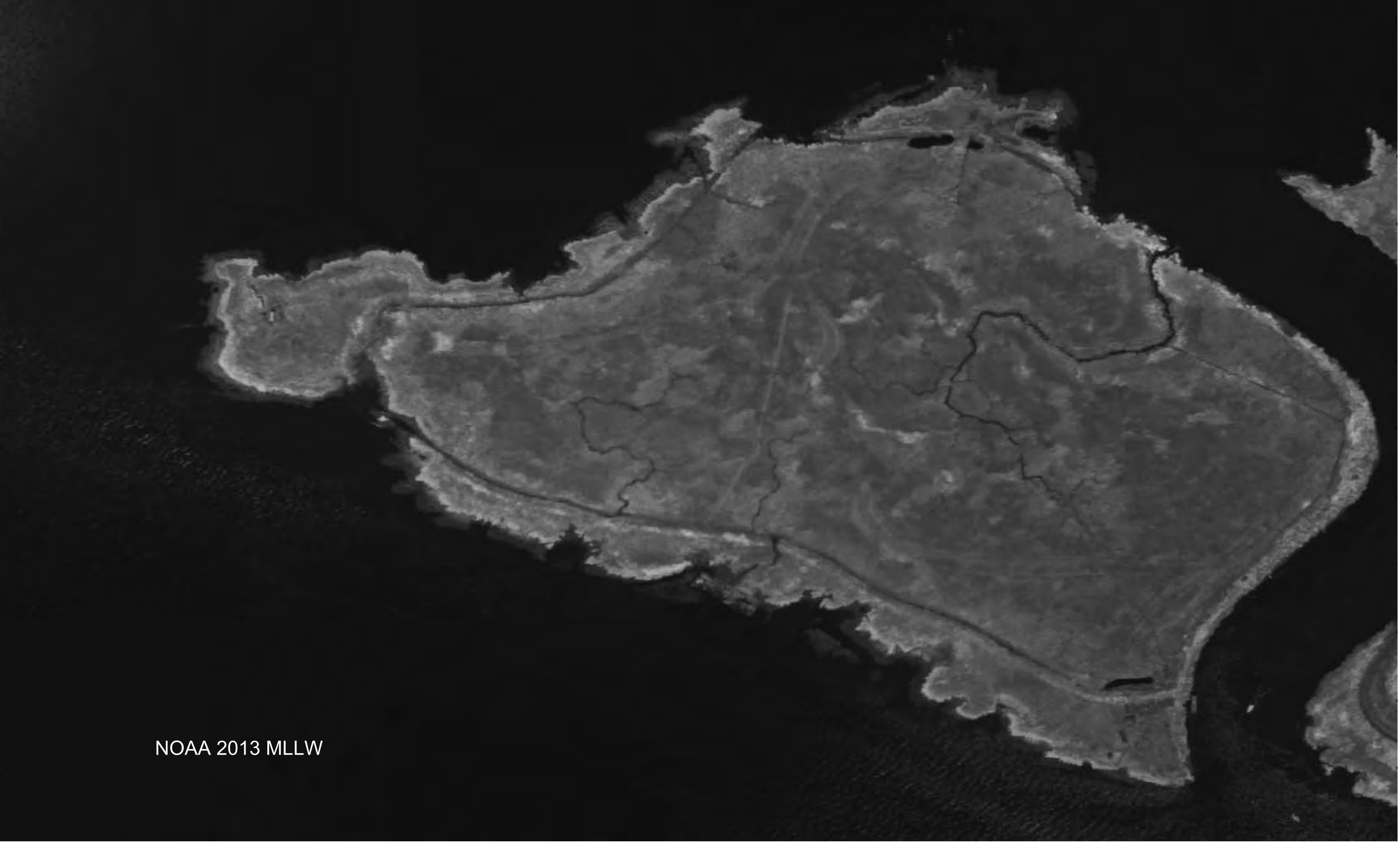


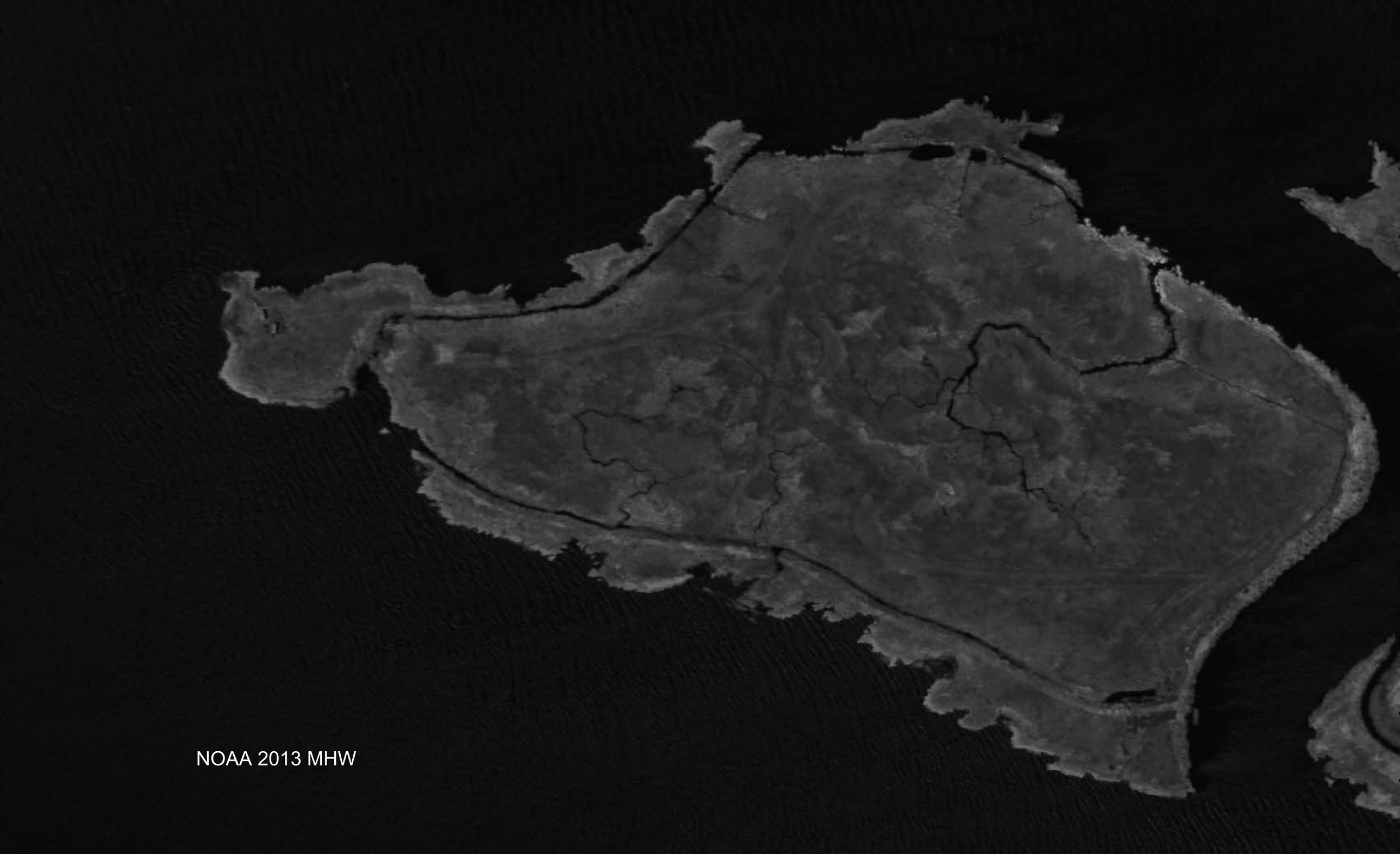


Point Buckler
1984

0 125 250 500 Feet

Point Buckler
2011


NOAA 2013 MLLW


NOAA 2013 MHW

0 125 250 500 Feet

Point Buckler
2015