APPENDIX D – PERTINENT CORRESPONDENCE

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DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

MAY 27 2016

Planning and Policy Division
Environmental Branch

The Honorable Billy Cypress
Chairman, Miccosukee Tribe of Indians of Florida
Post Office Box 440021, Tamiami Station
Miami, FL 33144

Dear Chairman Cypress:

The Jacksonville District, U.S. Army Corps of Engineers (Corps) is beginning preparation of a Supplemental Environmental Assessment (EA) for the Increment 1 field test that includes relaxation of the Gage-3273 (G-3273) constraint and operation of water control structures S-356 and S-357N (Figure 1). The purpose of the field test is to evaluate raising or removing the existing G-3273 stage constraint to enable increased water deliveries from Water Conservation Area 3A (WCA 3A) to Everglades National Park (ENP) through Northeast Shark River Slough for the benefit of natural resources. The field test is the first in a series of sequential efforts that are intended to incorporate constructed features of the Modified Water Deliveries (MWD) to ENP and Canal 111 South Dade projects into system-wide Central and Southern Florida (C&SF) Project operations. A notice of availability for the EA and Proposed Finding of No Significant Impact for the field test was transmitted to the Miccosukee Tribe on February 4, 2015.

The C&SF system-wide project is located in South Florida and includes portions of several counties as well as portions of ENP, Big Cypress National Preserve, and adjacent areas. The 1992 MWD General Design Memorandum defines the project boundary as Shark River Slough and that portion of the C&SF Project north of S-331 to include WCA 3. G-3273 lies within eastern ENP, directly west of 8.5 Square Mile Area (8.5 SMA) (Figure 1).

Implementation of the field test occurred from October 15, 2015 to December 1, 2015 after which the Corps initiated pre-storm drawdown and flood control operations due to very strong El Nino conditions experienced in the WCAs this dry season. The Corps pursued authorization of the State of Florida's request for a temporary emergency deviation to the operating limit constraint of 7.5 feet National Geodetic Vertical Datum (of 1929) in the L-29 Canal to alleviate high water levels within WCA 3A in February of 2016.

Implementation of the temporary emergency deviation occurred on February 15, 2016. At this time, the Corps is proposing to return to a revised operational strategy for the Increment 1 field test upon completion of the L-29 Canal temporary emergency deviation. Upon review of monitoring data associated with Increment 1 and the temporary emergency deviation, it became apparent that modifications are necessary to the field test operational strategy to ensure flood mitigation within 8.5 SMA.

We intend to pursue an open and public process and recognize the obligations that the Corps has to the Miccosukee Tribe including consultation under the National Environmental Policy Act (NEPA) and National Historic Preservation Act. Your involvement through direct consultation, combined with other participants, will provide the skills, knowledge, and experience vital for successful implementation of the action and will assist in achieving concurrence and support by key agency stakeholders throughout implementation. We anticipate transmitting the Supplemental NEPA document for your review in the next week or so. Prior consultation for the field test was initiated with Chairman Colley Billie on June 26, 2014. If you have any questions regarding the information in this letter, please feel free to contact me or you may contact Mrs. Melissa Nasuti at (904) 232-1368 or melissa.a.nasuti@usace.army.mil.

Sincerely,

Jason A. Kirk, P.E.
Colonel, U.S. Army
District Commander

Enclosure

cc:
Mr. Fred Dayhoff, Section 106/NAGPRA Representative, Consultant to Miccosukee Tribe, HC 61SR 68 Old Loop Road, Ochopee, FL 34141

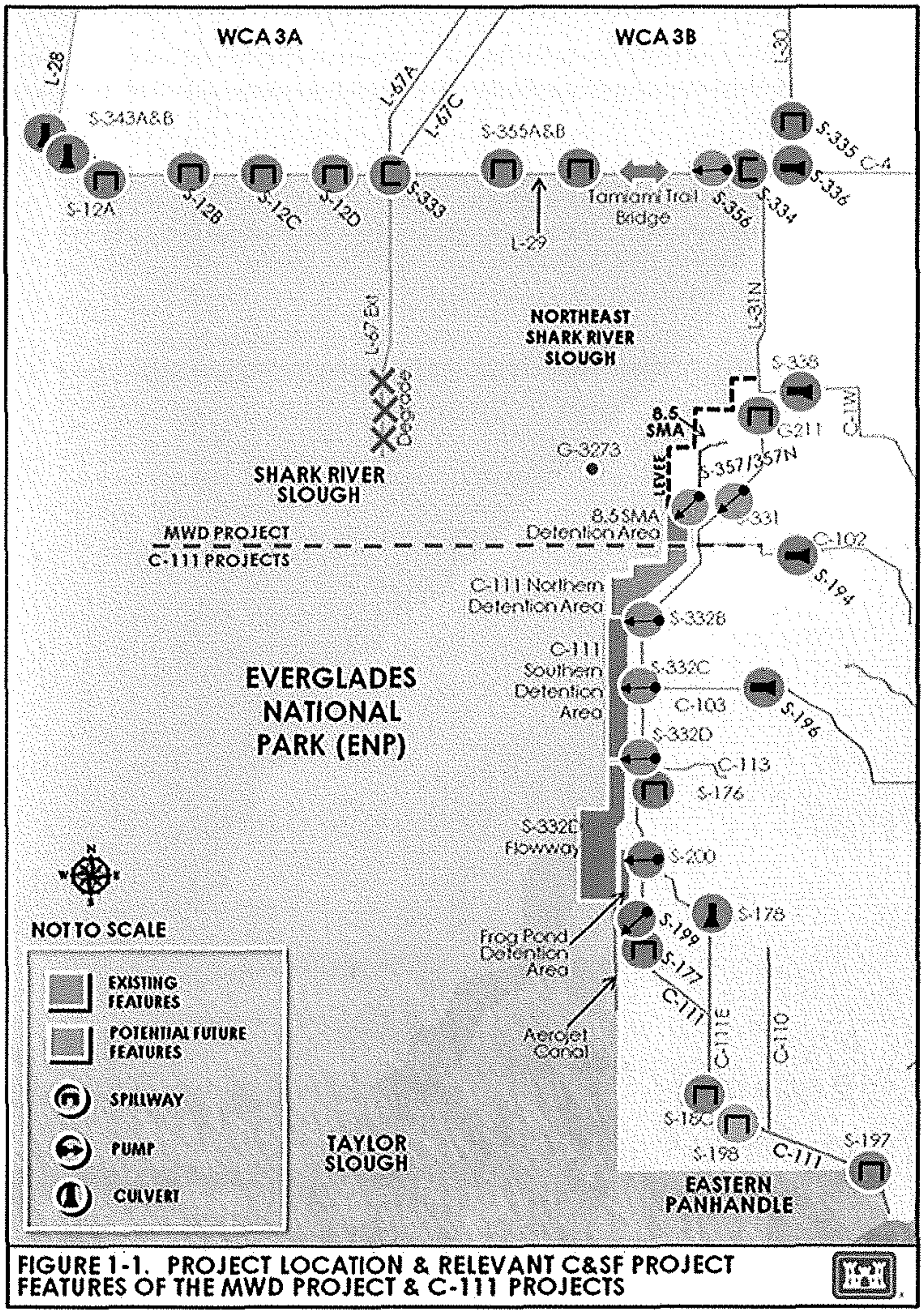

Figure 1. Project Area

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

MAY 27 2016

Planning and Policy Division
Environmental Branch

The Honorable James Billie
Chairman, Seminole Tribe of Florida
6300 Sterling Road
Hollywood, FL 33024

Dear Chairman Billie:

The Jacksonville District, U.S. Army Corps of Engineers (Corps) is beginning preparation of a Supplemental Environmental Assessment (EA) for the Increment 1 field test that includes relaxation of the Gage-3273 (G-3273) constraint and operation of water control structures S-356 and S-357N (Figure 1). The purpose of the field test is to evaluate raising or removing the existing G-3273 stage constraint to enable increased water deliveries from Water Conservation Area 3A (WCA 3A) to Everglades National Park (ENP) through Northeast Shark River Slough for the benefit of natural resources. The field test is the first in a series of sequential efforts that are intended to incorporate constructed features of the Modified Water Deliveries (MWD) to ENP and Canal 111 South Dade projects into system-wide Central and Southern Florida (C&SF) Project operations. A notice of availability for the EA and Proposed Finding of No Significant Impact for the field test was transmitted to the Seminole Tribe on February 4, 2015.

The C&SF system-wide project is located in South Florida and includes portions of several counties as well as portions of ENP, Big Cypress National Preserve, and adjacent areas. The 1992 MWD General Design Memorandum defines the project boundary as Shark River Slough and that portion of the C&SF Project north of S-331 to include WCA 3. G-3273 lies within eastern ENP, directly west of 8.5 Square Mile Area (8.5 SMA) (Figure 1).

Implementation of the field test occurred from October 15, 2015 to December 1, 2015 after which the Corps initiated pre-storm drawdown and flood control operations due to very strong El Nino conditions experienced in the WCAs this dry season. The Corps pursued authorization of the State of Florida's request for a temporary emergency deviation to the operating limit constraint of 7.5 feet National Geodetic Vertical Datum (of 1929) in the L-29 Canal to alleviate high water levels within WCA 3A in February of 2016.

Implementation of the temporary emergency deviation occurred on February 15, 2016. At this time, the Corps is proposing to return to a revised operational strategy for the Increment 1field test upon completion of the L-29 Canal temporary emergency deviation. Upon review of monitoring data associated with Increment 1 and the temporary emergency deviation, it became apparent that modifications are necessary to the field test operational strategy to ensure flood mitigation within 8.5 SMA.

We intend to pursue an open and public process and recognize the obligations that the Corps has to the Seminole Tribe including consultation under the National Environmental Policy Act (NEPA) and National Historic Preservation Act. Your involvement through direct consultation, combined with other participants, will provide the skills, knowledge, and experience vital for successful implementation of the action and will assist in achieving concurrence and support by key agency stakeholders throughout implementation. Prior consultation for the field test was initiated on June 26, 2014. If you have any questions regarding this proposed action, If you have any questions regarding the information in this letter, please feel free to contact me or you may contact Mrs. Melissa Nasuti at (904) 232-1368 or melissa.a.nasuti@usace.army.mil.

Sincerely,

Jason A. Kirk, P.E.
Colonel, U.S. Army
District Commander

Enclosure

cc:
Cherise Maples, Director, Environmental Resource Management,
Seminole Tribe of Florida, 6300 Stirling Road, Hollywood, FL 33024
Dr. Paul N. Backhouse, Ph.D., Tribal Historic Preservation Officer,
Seminole Tribe of Florida, Ah Tha Thi Ki Museum, 30290 Josie Billie Hwy, PMB 1004, Clewiston, Florida 33440

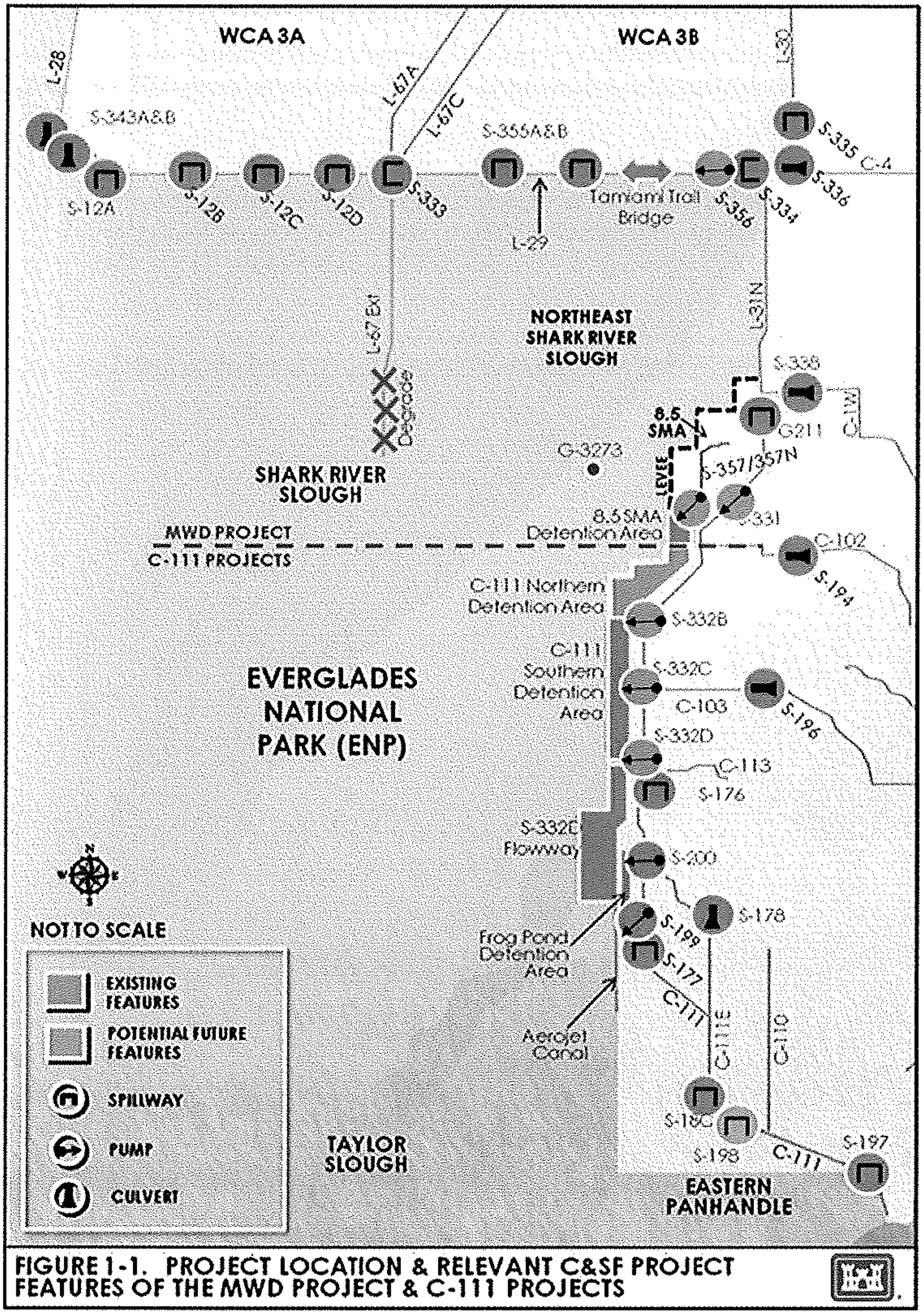

Figure 1. Project Area

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

Planning and Policy Division
Environmental Branch

OCT 1 8 2016

Mr. Pedro Ramos
Superintendent
Everglades National Park
40001 State Road 9336
Homestead, Florida 33034-6733

Dear Mr. Ramos:

The purpose of this letter is to request information regarding potential effects to significant historic properties located within Everglades National Park (ENP). As you are aware the Jacksonville District, U.S. Army Corps of Engineers (Corps) is beginning preparation of an Environmental Assessment (EA) and conducting Section 106 consultation under the National Historic Preservation Act (NHPA) in relation to the proposed G-3273 Constraint Relaxation/S-356 Field Test and S-357N Revised Operational Strategy (hereafter referred to as Increment 1.1/1.2) which is an update to the Increment 1.0 field test. The Increment 1.0 field test (previously referred to as "Increment 1"), which was initiated on 15 October 2015, is the first in a series of three related, incremental efforts that will result in a Combined Operating Plan to be incorporated into the Water Conservation Areas, ENP, and ENP-South Dade Conveyance System Water Control Plan (2012 Water Control Plan). The currently proposed Increment 1.1/1.2 updated strategy seeks to increase flow to Northeast Shark River Slough (NESRS) while: (1) maintaining operating limits in the L-29 Canal that preclude adverse impacts to the remaining private ownership along the L-29 Canal; (2) facilitating Modified Water Deliveries (MWD) to Everglades National Park construction for the deepening of the C-358 Canal and installation of S-357N; (3) facilitating the construction of the C-111 South Dade Contract 8 and Contract 8A; (4) maintaining flood mitigation for the 8.5 Square Mile Area (SMA); (5) maintaining pre-existing flood protection along the L-31N and C-111 Canals, and (6) providing supplemental flows to Taylor Slough to help facilitate the recovery of Florida Bay from the 2015 extreme Hyper-Salinity event and to compensate for potential reductions in delivery of water to Taylor Slough area as a result of achieving the above stated goals.

The purpose of this modification of the field test is to capture operational capabilities that were recently achieved during Emergency Operations and to address the mandated terms and conditions of the Everglades Restoration Transition Plan (ERTP) Biological Opinion that was issued by the U.S. Fish and Wildlife Service on July 22, 2016.

This will involve the continued removal of the existing G-3273 stage constraint of 6.8 feet National Geodetic Vertical Datum (NGVD) to increase water deliveries from Water Conservation Area (WCA) 3A to ENP through NESRS, and a delay in opening and implementing early closure of the S-12A, S-12B, S-343A, S-343B, and S-344 structures beyond their current restrictions to limit flow into western SRS and provide suitable nesting habitat for the Cape Sable seaside sparrow.

The modified field test will see water elevation within the L-29 canal be maintained at 7.5 NGVD (Increment 1.1) until operation requirements within the larger system are brought on line to raise the L-29 canal levels to 7.8 NGVD (Increment 1.2). This two-step approach is intended to allow the incorporate the constructed features of the MWD and the Canal 111 South Dade (C-111 SD) projects into system-wide Central and Southern Florida (C&SF) Project operations. This data will be combined with the data obtained in Increments 1 and 2 and will be utilized to determine effects associated with the third increment which will set the final operation schedule for MWD.

As the project is a planned deviation from the Corps current water regulation schedule, it is an undertaking defined by Section XIV (A) Deviations under the Programmatic Agreement (ERTP PA) entitled: *Programmatic Agreement Among The U.S. Army Corps Of Engineers, The Advisory Council On Historic Preservation, and The Florida State Historic Preservation Officer Regarding The Everglades Restoration Transition Plan For Features of The Central and Southern Florida Project In Southern Florida*. This PA was signed by ENP on 23 August 2012 and remains in effect in regards to the project for which it was designed. Under this section of the PA, the Corps is currently consulting with all interested parties to notify them of this separate undertaking and to determine what, if any, potential for effects exists associated with this short term field test that will end with the implementation of Increment 2. Key to this incremental approach and completion of the MWD project is gathering information on what, if any, anticipated effects ENP anticipates on cultural resources located in the Park in relation to Increments 1.1/1.2 and 2. Based on information gathered during the Emergency Deviation when the L-29 canal reached a headwater of 8.3 NGVD, water levels in ENP will be lower than those experienced during the Emergency Deviation (February 15 – May 11, 2016) as a result of Increment 1.1/1.2. While the Corps does not anticipate any adverse effects to cultural resources, we are requesting input from ENP to move forward with our formal determination of effects for this project. Specifically we need information for Increment 1.1/1.2 test and will re-consult on each increment thereafter. If ENP does anticipate any adverse effects we would like to request a meeting to discuss these effects and would hope that restrictions could be included within the Increment 1.1/1.2 monitoring plan such that a no adverse effect determination can be achieved and be utilized in our formal Section 106 determination and subsequent EA.

Pursuant to 36 CFR § 800.4, I am formally requesting consultation on this project. At your convenience, Corps staff will be available to meet to discuss any comments or concerns you may have regarding this project. Dr. Dan Hughes will be the Corps' lead on this effort. If you are or members of your staff have any questions, please contact Dr. Hughes by phone at 904-232-3028 or by e-mail at daniel.b.hughes@usace.army.mil.

Sincerely,

Gina Paduano Ralph, Ph.D. for
Environmental Branch Chief, Planning Division

Copies Furnished:
Penelope Del Bene, Chief, Cultural Resources, Everglades National Park, 40001 State Road 9336 Homestead, Florida 33034-6733

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

NOV 1 8 2016

Planning and Policy Division
Environmental Branch

Mr. Fred Dayhoff, Tribal Representative
NAGPRA, Section 106
Miccosukee Tribe of Indians of Florida
HC 61 SR 68
Ochopee, Florida 34141

Re: Increment 1.1/1.2 Request for Consultation

Dear Mr. Dayhoff:

The U.S. Army Corps of Engineers, Jacksonville District (Corps) is beginning preparation of an Environmental Assessment (EA) under the National Environmental Policy Act and conducting Section 106 consultation under the National Historic Preservation Act in relation to the proposed G-3273 Constraint Relaxation/S-356 Field Test and S-357 North (N) Revised Operational Strategy (hereafter referred to as Increment 1.1/1.2). This is an update to the Increment 1.0 field test (previously referred to as "Increment 1"), which was initiated on October 15, 2015. Increment 1 was the first in a series of three incremental efforts that will result in a Combined Operating Plan to be incorporated into the Water Conservation Area (WCA), Everglades National Park (ENP), and ENP-South Dade Conveyance System Water Control Plan (2012 Water Control Plan). The proposed Increment 1.1/1.2 strategy seeks to increase flow to Northeast Shark River Slough (SRS) while: (1) maintaining operating limits in the L-29 Canal that prevent adverse impacts to the remaining private properties along the L-29 Canal; (2) facilitating Modified Water Deliveries (MWD) to ENP construction for the deepening of the C-358 Canal and installation of S-357N; (3) facilitating the construction of the C-111 South Dade Contract 8 and Contract 8A; (4) maintaining flood mitigation for the 8.5 Square Mile Area; (5) maintaining pre-existing flood protection along the L-31N and C-111 Canals, and (6) providing supplemental flows to Taylor Slough to help facilitate the recovery of Florida Bay from the 2015 extreme hyper-salinity event, and (7) to compensate for potential reductions in delivery of water to Taylor Slough area as a result of achieving the above stated goals.

The modified field test purpose is to capture operational capabilities that were recently achieved during Emergency Operations and to address the mandated terms and conditions of the Everglades Restoration Transition Plan (ERTP) Biological Opinion that was issued by the U.S. Fish and Wildlife Service on July 22, 2016. Specific modifications involve the continued removal of the existing G-3273 stage constraint of 6.8 feet National Geodetic Vertical Datum (NGVD) to increase water deliveries from WCA 3A to ENP through Northeast SRS, and a delay in opening and implementing early closure of the S-12A, S-12B, S-343A, S-343B, and S-344 structures beyond their current restrictions to limit flow into western SRS and provide suitable nesting habitat for the Cape Sable seaside sparrow.

These structures will now be closed from October 1 through July 14. The previous closure period under Increment 1.0 for S-12A, S-343A, S-343B, and S-344 was November 1 to July 14 and the previous closure period under Increment 1.0 for S-12B was January 1 to July 14.

Under the modified field test water elevations within the L-29 canal will be maintained at 7.5 feet NGVD (Increment 1.1) until operation requirements within the larger system are brought on line to raise the L-29 canal levels to 7.8 feet NGVD (Increment 1.2). This two-step approach is intended to allow incorporation of constructed MWD and the C-111 South Dade project features into system-wide Central and Southern Florida Project operations. Data obtained as a result of this test will be combined with the data obtained in Increments 1 and 2 and will be utilized to determine effects associated with the third increment which will set the final operation schedule for MWD.

As the project is a planned deviation from the Corps current water regulation schedule, it is an undertaking defined by Section XIV (A) Deviations under the Programmatic Agreement (ERTP PA) entitled: *Programmatic Agreement Among The U.S. Army Corps Of Engineers, The Advisory Council On Historic Preservation, and The Florida State Historic Preservation Officer Regarding The Everglades Restoration Transition Plan For Features of The Central and Southern Florida Project In Southern Florida*. Under this section of the PA, the Corps is currently consulting with all interested parties to notify them of this separate undertaking and to determine what, if any, potential for effects exists associated with this short term field test that will end with the implementation of Increment 2. Key to this incremental approach and completion of the MWD project is consulting with the Miccosukee Tribe of Indians of Florida and to coordinate any potential effects to cultural resources.

Pursuant to Section 106 of the National Historic Preservation Act (16 USC 470) and it's implementing regulations (36 CFR 800), and in consideration of the Corps' Trust Responsibilities, the Corps kindly requests continued coordination and consultation on effects to cultural resources for this project. At your convenience, Corps staff will be available to meet to discuss any comments or concerns you may have regarding this project. Dr. Dan Hughes will be the Corps' lead on this effort. If you are or members of your staff have any questions, please contact Dr. Hughes by phone at 904-232-3028 or by e-mail at daniel.b.hughes@usace.army.mil.

Sincerely,

Gina Paduano Ralph, ~~Ph.D.~~
Chief, Environmental Branch

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

NOV 18 2016

Planning and Policy Division
Environmental Branch

Dr. Paul Backhouse, THPO
Seminole Tribe of Florida
Tribal Historic Preservation Office
30290 Josie Billie Highway
PMP 1004
Clewiston, Florida 33440

Re: Increment 1.1/1.2 Request for Consultation

Dear Dr. Backhouse:

The U.S. Army Corps of Engineers, Jacksonville District (Corps) is beginning preparation of an Environmental Assessment (EA) under the National Environmental Policy Act and conducting Section 106 consultation under the National Historic Preservation Act in relation to the proposed G-3273 Constraint Relaxation/S-356 Field Test and S-357 North (N) Revised Operational Strategy (hereafter referred to as Increment 1.1/1.2). This is an update to the Increment 1.0 field test (previously referred to as "Increment 1"), which was initiated on October 15, 2015. Increment 1 was the first in a series of three incremental efforts that will result in a Combined Operating Plan to be incorporated into the Water Conservation Area (WCA), Everglades National Park (ENP), and ENP-South Dade Conveyance System Water Control Plan (2012 Water Control Plan). The proposed Increment 1.1/1.2 strategy seeks to increase flow to Northeast Shark River Slough (SRS) while: (1) maintaining operating limits in the L-29 Canal that prevent adverse impacts to the remaining private properties along the L-29 Canal; (2) facilitating Modified Water Deliveries (MWD) to ENP construction for the deepening of the C-358 Canal and installation of S-357N; (3) facilitating the construction of the C-111 South Dade Contract 8 and Contract 8A; (4) maintaining flood mitigation for the 8.5 Square Mile Area; (5) maintaining pre-existing flood protection along the L-31N and C-111 Canals, and (6) providing supplemental flows to Taylor Slough to help facilitate the recovery of Florida Bay from the 2015 extreme hyper-salinity event, and (7) to compensate for potential reductions in delivery of water to Taylor Slough area as a result of achieving the above stated goals.

The modified field test purpose is to capture operational capabilities that were recently achieved during Emergency Operations and to address the mandated terms and conditions of the Everglades Restoration Transition Plan (ERTP) Biological Opinion that was issued by the U.S. Fish and Wildlife Service on July 22, 2016.

Specific modifications involve the continued removal of the existing G-3273 stage constraint of 6.8 feet National Geodetic Vertical Datum (NGVD) to increase water deliveries from WCA 3A to ENP through Northeast SRS, and a delay in opening and implementing early closure of the S-12A, S-12B, S-343A, S-343B, and S-344 structures beyond their current restrictions to limit flow into western SRS and provide suitable nesting habitat for the Cape Sable seaside sparrow. These structures will now be closed from October 1 through July 14, annually. The previous closure period under Increment 1.0 for S-12A, S-343A, S-343B, and S-344 was November 1 to July 14 and the previous closure period under Increment 1.0 for S-12B was January 1 to 14 July.

Under the modified field test water elevations within the L-29 canal will be maintained at 7.5 feet NGVD (Increment 1.1) until operation requirements within the larger system are brought on line to raise the L-29 canal levels to 7.8 feet NGVD (Increment 1.2). This two-step approach is intended to allow incorporation of constructed MWD and the C-111 South Dade project features into system-wide Central and Southern Florida Project operations. Data obtained as a result of this test will be combined with the data obtained in Increments 1 and 2 and will be utilized to determine effects associated with the third increment which will set the final operation schedule for MWD.

As the project is a planned deviation from the Corps current water regulation schedule, it is an undertaking defined by Section XIV (A) Deviations under the Programmatic Agreement (ERTP PA) entitled: *Programmatic Agreement Among The U.S. Army Corps Of Engineers, The Advisory Council On Historic Preservation, and The Florida State Historic Preservation Officer Regarding The Everglades Restoration Transition Plan For Features of The Central and Southern Florida Project In Southern Florida*. This PA was signed by the Seminole Tribe of Florida (STOF) Chairman on September 21, 2012 and remains in effect in regards to the project for which it was designed. Under this section of the PA, the Corps is currently consulting with all interested parties to notify them of this separate undertaking and to determine what, if any, potential for effects exists associated with this short term field test that will end with the implementation of Increment 2. Key to this incremental approach and completion of the MWD project is consulting with the STOF and to coordinate any potential effects to cultural resources with the Tribal Historic Preservation Officer.

Pursuant to Section 106 of the National Historic Preservation Act (16 USC 470) and it's implementing regulations (36 CFR 800), and in consideration of the Corps' Trust Responsibilities, the Corps kindly requests continued coordination and consultation on effects to cultural resources for this project.

At your convenience, Corps staff will be available to meet to discuss any comments or concerns you may have regarding this project. Dr. Dan Hughes will be the Corps' lead on this effort. If you are or members of your staff have any questions, please contact Dr. Hughes by phone at 904-232-3028 or by e-mail at daniel.b.hughes@usace.army.mil.

Sincerely,

Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

cc:

Anne Mullins, Deputy Tribal Historic Preservation Officer, Seminole Tribe of Florida, 30290 Josie Billie Highway, PMP 1004, Clewiston, Florida 33440
Bradley Mueller, Compliance Review, Seminole Tribe of Florida, 30290 Josie Billie Highway, PMP 1004, Clewiston, Florida 33440

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

NOV 1 8 2016

Planning and Policy Division
Environmental Branch

Tim Parsons, Ph.D.
Director Division of Historical Resources
500 South Bronough Street
Tallahassee, Florida 32399-0250

Dear Dr. Parsons:

The purpose of this letter is to request information regarding potential effects to significant historic properties located within Water Conservation Area (WCA) 3. The U.S. Army Corps of Engineers, Jacksonville District (Corps) is beginning preparation of an Environmental Assessment (EA) and conducting Section 106 consultation under the National Historic Preservation Act in relation to the proposed G-3273 Constraint Relaxation/S-356 Field Test and S-357 North (N) Revised Operational Strategy (hereafter referred to as Increment 1.1/1.2). This is an update to the Increment 1.0 field test (previously referred to as "Increment 1"), which was initiated on 15 October 2015, and was the first in a series of three incremental efforts that will result in a Combined Operating Plan to be incorporated into the WCAs, Everglades National Park (ENP), and ENP-South Dade Conveyance System Water Control Plan (2012 Water Control Plan). The proposed Increment 1.1/1.2 strategy seeks to increase flow to Northeast Shark River Slough (SRS) while: (1) maintaining operating limits in the L-29 Canal that prevent adverse impacts to the remaining private properties along the L-29 Canal; (2) facilitating Modified Water Deliveries (MWD) to ENP construction for the deepening of the C-358 Canal and installation of S-357N; (3) facilitating the construction of the C-111 South Dade Contract 8 and Contract 8A; (4) maintaining flood mitigation for the 8.5 Square Mile Area; (5) maintaining pre-existing flood protection along the L-31N and C-111 Canals, and (6) providing supplemental flows to Taylor Slough to help facilitate the recovery of Florida Bay from the 2015 extreme hyper-salinity event, and (7) to compensate for potential reductions in delivery of water to Taylor Slough area as a result of achieving the above stated goals.

The modified field test purpose is to capture operational capabilities that were recently achieved during Emergency Operations and to address the mandated terms and conditions of the Everglades Restoration Transition Plan (ERTP) Biological Opinion that was issued by the U.S. Fish and Wildlife Service on July 22, 2016. Specific modifications involve the continued removal of the existing G-3273 stage constraint of 6.8 feet National Geodetic Vertical Datum (NGVD) to increase water deliveries from WCA 3A to ENP through NESRS, and a delay in opening and implementing early closure of the S-12A, S-12B, S-343A, S-343B, and S-344 structures beyond their current restrictions to limit flow into western SRS and provide suitable nesting habitat for the Cape Sable seaside sparrow. These structures will now be closed from 1 October through 14 July.

The previous closure period under Increment 1.0 for S-12A, S-343A, S-343B, and S-344 was 1 November to 14 July and the previous closure period under Increment 1.0 for S-12B was 1 January to 14 July.

Under the modified field test water elevations within the L-29 canal will be maintained at 7.5 NGVD (Increment 1.1) until operation requirements within the larger system are brought on line to raise the L-29 canal levels to 7.8 NGVD (Increment 1.2). This two-step approach is intended to allow incorporation of constructed MWD and the C-111 South Dade project features into system-wide Central and Southern Florida Project operations. Data obtained as a result of this test will be combined with the data obtained in Increments 1 and 2 and will be utilized to determine effects associated with the third increment which will set the final operation schedule for MWD.

As the project is a planned deviation from the Corps current water regulation schedule, it is an undertaking defined by Section XIV (A) Deviations under the Programmatic Agreement (ERTP PA) entitled: *Programmatic Agreement Among The U.S. Army Corps Of Engineers, The Advisory Council On Historic Preservation, and The Florida State Historic Preservation Officer Regarding The Everglades Restoration Transition Plan For Features of The Central and Southern Florida Project In Southern Florida.* The ERTP PA was signed by the Florida State Historic Preservation Officer on 8 August 2012 and remains in effect in regards to the project for which it was designed. Under this section of the PA, the Corps is currently consulting with all interested parties to notify them of this separate undertaking and to determine what, if any, potential for effects exists associated with this short term field test that will end with the implementation of Increment 2. Key to this incremental approach and completion of the MWD Project is gathering information on what, if any, effects the Division of Historical Resources (DHR) anticipates on cultural resources located in the WCA 3 in relation to Increments 1.1/1.2 and 2. Based on information gathered from Corps modeling of water levels over the last 52 years, water levels within WCA 3 may increase due to the associated closure of the S-12s during Increment 1.1/1.2. Increases in water levels are projected to vary from north to south. Tree Islands in the northern portion of WCA 3 are expected to experience increases varying from 0.01 to 0.17 inch when compared with water levels observed during Increment 1.0. Tree islands in the southern portion of WCA 3 are expected to experience increases varying from 0.52 to 1.57 inches when compared with water levels observed during Increment 1.0. Changes in water levels within WCA 3 are considerably lower than those observed during the Interim Operational Plan for Protection of the Cape Sable Seaside Sparrow that governed the system between 2002 and 2012. It is important to note that no tree islands that do not overtop seasonally will be overtopped as a result of this operational change.

While the Corps does not anticipate any adverse effects to cultural resources, we are requesting input from the DHR to move forward with our formal determination of effects for this project. Specifically, we need information on anticipated effects to cultural resources for the Increment 1.1/1.2 test and will re-consult on each increment thereafter. If the DHR does anticipate any adverse effects, we would like to request a meeting to discuss these effects and would hope that restrictions could be included within the Increment 1.1/1.2 monitoring plan such that a no adverse effect determination can be achieved and be utilized in our formal Section 106 determination and subsequent EA.

Pursuant to 36 CFR § 800.4, I am formally requesting consultation on this project. At your convenience, Corps staff will be available to meet and discuss any comments or concerns you may have regarding this project. Dr. Dan Hughes will be the Corps' lead on this effort. If you are or members of your staff have any questions, please contact Dr. Hughes by phone at 904-232-3028 or by e-mail at daniel.b.hughes@usace.army.mil.

Sincerely,

Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

cc:

Mary Glowacki, Florida State Archaeologist. 500 South Bronough Street
Tallahassee, Florida 32399-0250

Jason Aldridge, Compliance Review Supervisor, Deputy State Historic Preservation Officer,
500 South Bronough Street, Tallahassee, Florida 32399-0250

Nasuti, Melissa A CIV (US)

From: Nasuti, Melissa A CIV (US)
Sent: Wednesday, November 23, 2016 1:47 PM
To: rick.a.robbins@fl.usda.gov
Subject: Prime and Unique Farmland
Attachments: USDA-NRCS Correspondence.pdf; Increment1.1.2APE.cpg; Increment1.1.2APE.dbf; Increment1.1.2APE.prj; Increment1.1.2APE.sbn; Increment1.1.2APE.sbx; Increment1.1.2APE.shp; Increment1.1.2APE.shx; Project Map.pptx

Mr. Robbins,

Pursuant to the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (Corps) is preparing a Supplemental Environmental Assessment for a deviation to the current Water Conservation Areas (WCAs), Everglades National Park (ENP) to South Dade Conveyance System (SDCS) Water Control Plan. Operations in the project area have been governed by Increment 1 (G-3273/S-356 Field Test and S-357N Operational Strategy) which is also a deviation to the plan. The Corps initiated Increment 1 to raise the operational stage constraint for G-3273 (gage that lies within eastern ENP), and operate the S-356 pump station to return seepage from Northeast Shark River Slough (NESRS) to the adjacent L-31N Canal. The purpose of Increment 1 was to evaluate relaxing the existing G-3273 stage constraint to enable increased water deliveries from Water Conservation Area 3A (WCA 3A) to ENP through NESRS for the benefit of natural resources. The Corps is proposing to modify the operational strategy, currently defined in the Increment 1 EA and FONSI (dated May 27, 2015) to ensure flood mitigation within 8.5 Square Mile Area (located west of ENP) and to be able to continue working towards the construction of the Modified Water Deliveries (MWD) and Canal 111 (C-111) South Dade Projects. The Corps is also proposing to modify the operational strategy to address the mandated terms and conditions of the July 22, 2016 Everglades Restoration Transition Plan Biological Opinion (BO) issued by the U.S. Fish and Wildlife Service. The proposed action is part of a series of sequential efforts that are intended to incorporate constructed features of the MWD and C-111 South Dade Projects into system wide Central and Southern Florida (C&SF) Project operations. The C&SF system-wide project is located in South Florida and includes portions of several counties as well as portions of ENP, Big Cypress National Preserve, and adjacent areas.

The proposed action (referred to as Increment 1.1/1.2) within the forthcoming EA would occur within Miami-Dade County, Florida. I had previously received correspondence from you for purposes of the Increment 1 EA dated May 27, 2015 in which the USDA-NRCS had determined that there were delineations of Important Farmland Soils (Farmland of Unique Importance) within the project area. The NRCS had identified approximately 975 acres of Prime and Unique Farmland located mainly within the boundaries of ENP; noting that portions of the study area had not been mapped. See attached correspondence dated November 21, 2016.

As stated above, the Corps is preparing a supplemental EA. The study area of the Proposed Action has expanded from ENP to include WCA 3 (located directly north) as the deviation to the water control plan is proposing additional closures of the southern water control structures located within WCA 3A as a result of the recently issued BO, which limit flows into western Shark River Slough within ENP for the purposes of providing suitable nesting habitat for the endangered Cape Sable Seaside Sparrow. Conversion of prime and unique farmland within the project area is not anticipated for the Proposed Action described in the Supplemental EA. This is the same determination that was made for the prior EA. The attached map shows the expanded study area. Also attached are shape files associated with the project map. I am assuming that similar to last time, large portions of the project area have not been mapped since they are conservation lands.

Once again, implementation of the Proposed Action is not expected to result in significant impacts to study area land use. Conversion of cropland and/or agricultural lands is not anticipated under the Proposed Action.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning and Policy Division
Environmental Branch

NOV 2 3 2016

Mr. Larry Williams, Field Supervisor
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960

Dear Mr. Williams:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is proposing a deviation to the current Water Conservation Areas (WCAs), Everglades National Park (ENP) to South Dade Conveyance System (SDCS) Water Control Plan (Corps 2012). Operations in the project area (Figure 1) have been governed by Increment 1 (G-3273/S-356 Field Test and S-357 N Operational Strategy) which is also a deviation to the plan. The Corps initiated Increment 1 to raise the operational stage constraint for G-3273, and operate the S-356 pump station to return seepage from Northeast Shark River Slough (NESRS) to the adjacent L-31N Canal. The purpose of Increment 1 was to evaluate relaxing the existing G-3273 stage constraint to enable increased water deliveries from Water Conservation Area 3A (WCA 3A) to ENP through NESRS for the benefit of natural resources.

The Corps is proposing to modify the operational strategy, currently defined in the Increment 1 Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) (dated May 27, 2015) to ensure flood mitigation within 8.5 Square Mile Area (8.5 SMA) and to be able to continue working towards the construction of the Modified Water Deliveries (MWD) and Canal 111 (C-111) South Dade Projects. The Corps is also proposing to modify the operational strategy to address the mandated terms and conditions of the July 22, 2016 Everglades Restoration Transition Plan (ERTP) Biological Opinion (BO), which includes expanded closure periods of October 1 through July 15 for S-12A, S-12B, S-343A, S-343B, and S-344 as mandated by the Reasonable and Prudent Alternative (RPA). These potential closures are further outlined in Appendix F of the 2016 ERTP BO, which also discusses how to address potential openings between October and November if certain "high water criteria" affecting the critical flood control function of these structures are met. The RPA specifies that the Corps shall proceed as scheduled for completing National Environmental Policy Act (NEPA) analysis on Increment 1 Plus (referred to as Increment 1.1/1.2 within the forthcoming EA) and, as allowable by law, raising L-29 Canal levels up to 7.8 feet National Geodetic Vertical Datum (NGVD) prior to March 1, 2017. The attached operational strategy describes the Proposed Action.

Pursuant to Section 7 of the Endangered Species Act (ESA), the Corps has determined that Increment 1.1/1.2 will have the following effects on federally listed species and critical habitat as illustrated in Table 1. There has been no change in the operational intent of the Proposed Action that would require the need to re-initiate consultation with the U.S. Fish and Wildlife Service (Service) since the completion of prior resource agency consultation under ERTP. The July 2016 ERTP BO identifies a set of habitat performance targets that the Service believes will improve conditions for the Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*) (CSSS) and contribute toward the survival and recovery of the species; however the RPA does not prescribe specific SDCS operational changes. Modeling assumptions for SDCS operations as described in Appendix F of the 2016 ERTP BO have been adjusted under Increment 1.1/1.2 to provide sufficient flexibility for the Corps and South Florida Water Management District (SFWMD) water managers to achieve the intended performance from the RPA while taking into account the multiple purposes of the Central and Southern Florida (C&SF) Project. The operational ranges for Increment 1.1/1.2 are consistent with what was modeled during Endangered Species Act (ESA) consultation. Therefore, the operations for the SDCS have not been subsequently modified in a manner that causes an effect to listed species or critical habitat that is not considered within the 2016 ERTP BO.

It should be noted, that during the development of the operational strategy for Increment 1.1/1.2, operational modifications to provide supplemental flows to Taylor Slough were suggested to help facilitate the recovery of Florida Bay from the 2015 extreme hyper-salinity event consistent with current planning efforts developed by the SFWMD during the South Dade Investigation Workshops. Increment 1.1/1.2 includes the use of S-328 to increase deliveries to Taylor Slough up to 250 cubic feet per second as measured at S-332D. Prior to initial operation of S-328, construction of the three L-31W Canal plugs proposed between S-328 and the L-31W gap must be completed as identified in the 2016 C-111 South Dade Contract 9 EA dated June 2016. It is anticipated that the potential effects of the operation of S-328 would be less than that anticipated for the reintroduction of surface water flows into the head water of Taylor Slough under Corps Application Number SAJ-2005-09856, in which the Corps requested ESA concurrence for modifications to the C-111 Western Spreader Canal Project on behalf of the SFWMD for the S-200/L-31W connection and increased pump capacity for S-199 and S-200. The Service provided concurrence with the Corps determinations via correspondence dated November 10, 2016 including a may affect, not likely to adversely affect determination for the CSSS. During Increment 1.1/1.2, the Corps intends to operate C&SF infrastructure within the intent of the 2016 ERTP BO including the requirement to ensure that operations do not raise water levels above the ground surface in CSSS-C, D, and F in areas beyond 0.6 mile of the S-332 Detention Areas between March 1 and June 1.

A Monitoring Plan has been developed for Increment 1.1/1.2. Interagency workshops to facilitate discussion of field test performance relative to the achievement of goals and objectives are planned to be conducted.

Operations updates will be discussed on a weekly basis between water managers from the Corps and SFWMD, as well as ENP when needed, to provide collective interpretation of results and evaluate implementation of operations relative to the goals, objectives, and constraints. Corps, SFWMD, and ENP water managers will meet monthly to discuss the collected data and the results of preliminary analyses, as well as system conditions and Increment 1.1/1.2 operations. Results from these weekly and monthly coordination meetings will be further discussed with the project delivery team during regularly-scheduled interagency meetings to occur four times per year. Additional meetings (i.e. WCA 3 Periodic Scientist Calls) and/or workshops may be conducted in support of Increment 1.1/1.2 on an as-needed basis based upon ongoing or anticipated conditions within WCAs, ENP, and/or the SDCS.

Increment 1.1/1.2 meets the intent of the proposed BO operational changes for the WCA 3A control structures and the expanded operational changes within the SDCS. We request your concurrence with our determinations within 30 days of receipt of this letter. If the Service believes additional ESA consultation is necessary, please utilize this letter as our reinitiation request. If you have any questions concerning this project or our determination, please contact Mrs. Melissa Nasuti by email Melissa.A.Nasuti@usace.army.mil or by telephone 904-232-1368. Thank you for your assistance in this matter.

Sincerely,

Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Enclosures

cc:

Bob Progulske, U.S. Fish & Wildlife Service, South Florida Ecological Services Office, 1339 20th Street, Vero Beach, Florida 32960-3559
Miles Meyer, U.S. Fish & Wildlife Service, South Florida Ecological Services Office, 1339 20th Street, Vero Beach, Florida 32960-3559
Richard Fike, U.S. Fish & Wildlife Service, South Florida Ecological Services Office, 1339 20th Street, Vero Beach, Florida 32960-3559

TABLE 1. FEDERALLY THREATENED AND ENDANGERED SPECIES WITHIN THE PROJEC AREA AND SPECIES DETERMINATIONS FOR THE PROPOSED ACTION

Common Name	Scientific Name	Status	May Affect, Likely to Adversely Effect	May Affect, Not Likely to Adversely Effect	No Effect
Mammals					
Florida panther	*Puma concolor coryi*	E			X
Florida manatee	*Trichechus manatus latirostris*	E, CH			X
Florida bonneted bat	*Eumops floridanus*	E		X	
Birds					
Cape Sable seaside sparrow	*Ammodramus maritimus mirabilis*	E, CH		X	
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	E, CH		X	
Piping plover	*Charadrius melodus*	T			
Red-cockaded woodpecker	*Picoides borealis*	E			X
Roseate tern	*Sterna dougallii*	T			X
Wood stork	*Mycteria Americana*	T		X	
Reptiles					
American Alligator	*Alligator mississippiensis*	T, SA			X
American crocodile	*Crocodylus acutus*	T, CH			X
Eastern indigo snake	*Drymarchon corais couperi*	T			X
Gopher tortoise	*Gopherus polyphemus*	C			X
Green sea turtle*	*Chelonia mydas*	E			X
Hawksbill sea turtle*	*Eretmochelys imbricate*	E			X
Kemp's Ridley sea turtle*	*Lipodochelys kempii*	E			X
Leatherback sea turtle*	*Dermochelys coriacea*	E			X
Loggerhead sea turtle*	*Caretta*	T			X
Fish					
Smalltooth sawfish*	*Pristis pectinata*	E			X
Invertebrates					
Bartram's hairstreak butterfly	*Strymon acis bartrami*	E			X
Elkhorn coral*	*Acropora palmata*	T, CH			X
Florida leafwing butterfly	*Anaea troglodyta floridalis*	E			X
Miami blue butterfly	*Cyclargus thomasi bethunebakeri*	E			X
Schaus swallowtail butterfly	*Heraclides aristodemus ponceanus*	E			X
Staghorn coral*	*Acropora cervicornis*	T, CH			X
Stock Island tree snail	*Orthalicus reses* (not incl. *nesodryas*)	T			X
Plants					
Crenulate lead plant	*Amorpha crenulata*	E			X

Deltoid spurge	*Chamaesyce deltoidea spp. deltoidea*	E		X	
Garber's spurge	*Chamaesyce garberi*	T		X	
Johnson's seagrass*	*Halophila johnsonii*	E, CH			X
Okeechobee gourd	*Cucurbita okeechobeensis* ssp. *okeechobeenis*	E			X
Small's milkpea	*Galactia smallii*	E		X	
Tiny polygala	*Polygala smallii*	E		X	
Big pine partridge pea	*Chamaecrista lineata* var. *keyensis*	E			X
Blodgett's silverbush	*Argythamnia blodgettii*	T			X
Cape Sable thoroughwort	*Chromolaena frustrata*	E, CH			X
Carter's small-flowered flax	*Linum carteri* var. *carteri*	E, CH			X
Everglades bully	*Sideroxylon reclinatum spp. austrofloridense*	C			X
Florida brickell-bush	*Brickellia mosieri*	E, CH			X
Florida bristle fern	*Trichomanes punctatum* spp. *floridanum*	E			X
Florida semaphore cactus	*Consolea corallicola*	E, CH			X
Sand flax	*Linum arenicola*	E			X

E: Endangered; T: Threatened; CH: Critical Habitat; C: Candidate Species
* Marine species under the purview of National Marine Fisheries Service (NMFS), the Corps will conduct a separate consultation with NMFS

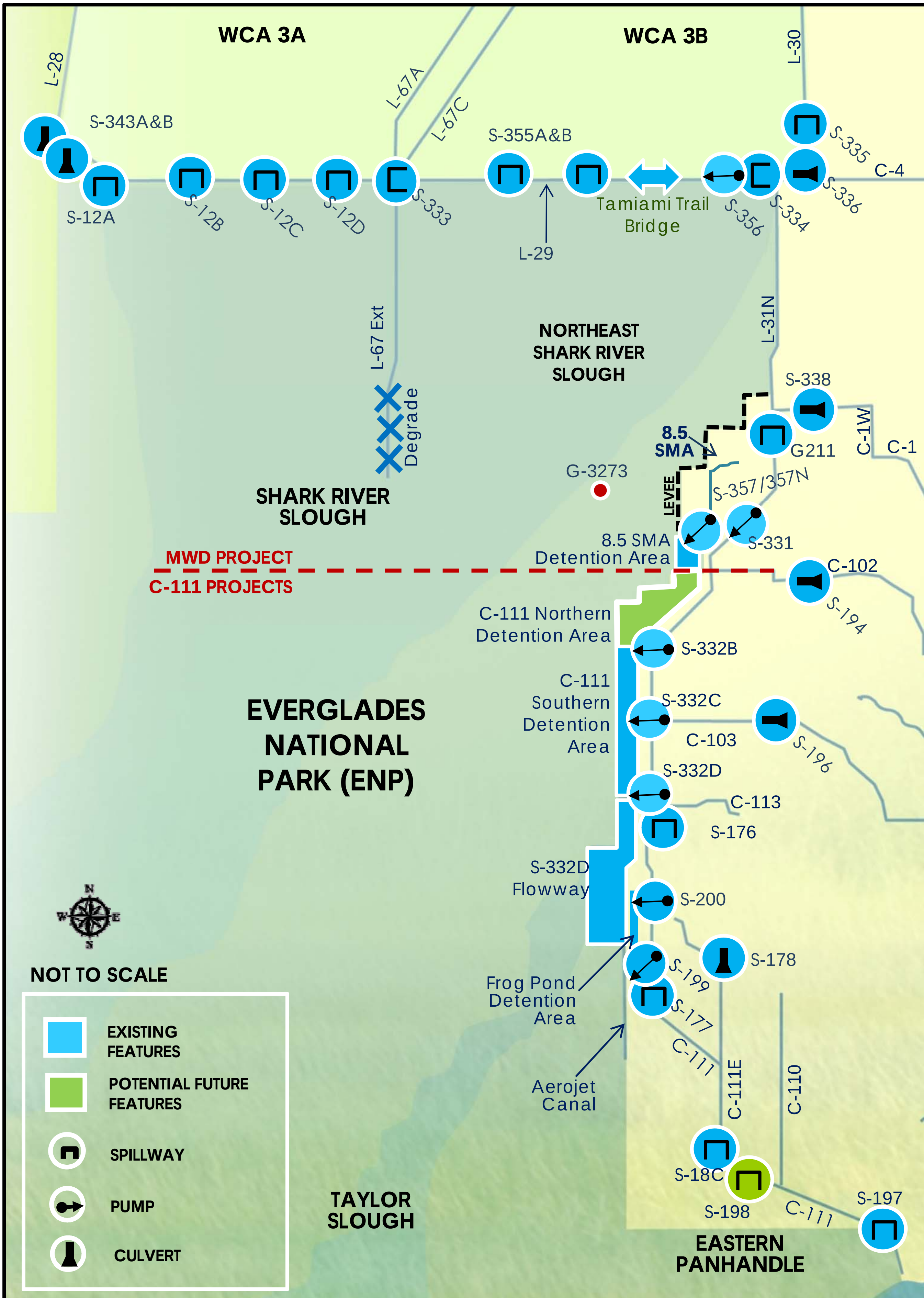

FIGURE 1. PROJECT LOCATION & RELEVANT C&SF PROJECT FEATURES OF THE MWD PROJECT & C-111 PROJECTS

Nasuti, Melissa A CIV (US)

From: Nasuti, Melissa A CIV (US)
Sent: Friday, December 02, 2016 10:45 AM
To: richard_fike@fws.gov; miles meyer; donald_progulske@fws.gov
Subject: RE: Increment 1.1/1.2 ESA Consultation
Attachments: USFWS Species Determinations 23 November 2016.pdf; USFWS Species Determination Amended 2 December 2016.pdf

Good Afternoon,

Please see the attached correspondence as it relates to Increment 1.1/1.2. Correspondence was provided on November 23, 2016 with regard to species effects determinations. As an oversight, a determination was not included within Table 1 of the attached letter for the piping plover. An amended table has been attached to this correspondence. The Corps has determined a "no effect" determination for the piping plover as a result of implementation of Increment 1.1/1.2.

Thank you,

Melissa Nasuti
U.S. Army Corps of Engineers
Planning and Policy Division
904-232-1368

-----Original Message-----
From: Nasuti, Melissa A CIV (US)
Sent: Wednesday, November 23, 2016 2:15 PM
To: richard_fike@fws.gov; miles meyer <miles_meyer@fws.gov>; donald_progulske@fws.gov
Subject: Increment 1.1/1.2 ESA Consultation

Good Afternoon,

Please see the attached documents as it relates to Increment 1.1/1.2. We request your concurrence with our determinations within 30 days of receipt of this letter. A hard copy of the attached will be placed in the mail shortly.

Thanks,

Melissa Nasuti
U.S. Army Corps of Engineers
Planning and Policy Division
904-232-1368

Nasuti, Melissa A CIV (US)

From: Robbins, Rick - NRCS, Gainesville, FL <rick.a.robbins@fl.usda.gov>
Sent: Wednesday, November 30, 2016 2:51 PM
To: Nasuti, Melissa A CIV (US)
Subject: [EXTERNAL] RE: Prime and Unique Farmland

Melissa,

We do not think that (in this case), the FPPA process applies. It is a temporary condition without any conversion of Important Farmland soils.

So, we would consider this project exempt from the FPPA process.

Best,
Rick

Rick Robbins
Soil Scientist
USDA-NRCS
2614 NW 43rd Street
Gainesville, FL 32606
(352) 338-9536

-----Original Message-----
From: Nasuti, Melissa A CIV (US) [mailto:Melissa.A.Nasuti@usace.army.mil]
Sent: Wednesday, November 23, 2016 1:47 PM
To: Robbins, Rick - NRCS, Gainesville, FL <rick.a.robbins@fl.usda.gov>
Subject: Prime and Unique Farmland

Mr. Robbins,

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Project operations.   The C&SF system-wide project is located in South Florida and includes portions of several counties as well as portions of ENP, Big Cypress National Preserve, and adjacent areas.

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Once again, implementation of the Proposed Action is not expected to result in significant impacts to study area land use. Conversion of cropland and/or agricultural lands is not anticipated under the Proposed Action.

Please let me know if further information is needed for purpose of consultation and/or to ensure compliance under the Farmland Protections Policy Act.

Melissa Nasuti
U.S. Army Corps of Engineers
Planning Division - Jacksonville District
701 San Marco Boulevard
Jacksonville, FL 32207
Office Phone:

Evaluating Water Management Scenarios To Support Habitat Management for the Cape Sable Seaside Sparrow

By James M. Beerens, Stephanie S. Romañach, and Mark McKelvy

Open-File Report 2016–1107

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
SALLY JEWELL, Secretary

U.S. Geological Survey
Suzette M. Kimball, Director

U.S. Geological Survey, Reston, Virginia: 2016

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Suggested citation:
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ISSN 2331-1258 (online)

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Evaluating Water Management Scenarios To Support Habitat Management for the Cape Sable Seaside Sparrow

By James M. Beerens, Stephanie S. Romañach, and Mark McKelvy

Abstract

The endangered Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) is endemic to south Florida and a key indicator species of marl prairie, a highly diverse freshwater community in the Florida Everglades. Maintenance and creation of suitable habitat is seen as the most important pathway to the persistence of the six existing sparrow subpopulations; however, major uncertainties remain in how to increase suitable habitat within and surrounding these subpopulations, which are vulnerable to environmental stochasticity. Currently, consistently suitable conditions for the Cape Sable seaside sparrow are only present in two of these subpopulations (B and E). The water management scenarios evaluated herein were intended to lower water levels and improve habitat conditions in subpopulation A and D, raise water levels to improve habitat conditions in subpopulations C and F, and minimize impacts to subpopulations B and E. Our objective in this analysis was to compare these scenarios utilizing a set of metrics (short- to long-time scales) that relate habitat suitability to hydrologic conditions. Although hydrologic outputs are similar across scenarios in subpopulation A, scenario R2H reaches the hydroperiod and depth suitability targets more than the other scenarios relative to ECB, while minimizing negative consequences to subpopulation E. However, although R2H hydroperiods are longer than those for ECB during the wet season in subpopulations C and F, depths during the breeding season are predicted to decrease in suitability (less than -50 cm) relative to existing conditions.

Introduction

The Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*; hereafter “sparrow” or “CSSS”) is endemic to south Florida and a key indicator species of marl prairie, a highly diverse freshwater community in the Florida Everglades. Marl prairie habitat is shaped by distinct flooding, drying, and fire intervals, which maintain periphyton production (Gaiser and others, 2011), vegetation composition (Sah and others, 2011), and habitat structure for wildlife (Lockwood and others, 2003). Historically, the location of marl prairie patches in the Everglades landscape shifted in response to changing hydroclimatic conditions; however, habitat loss and hydrologic alteration now restrict the range of this habitat, thereby narrowing the sparrow’s range and increasing their sensitivity to changing hydropatterns. As a result, sparrow numbers have declined as much as 60 percent range-wide since 1992 (Curnutt and others, 1998, Nott and others, 1998). Currently, the sparrow is restricted to the marl prairies of Everglades National Park (ENP) and Big Cypress National Preserve (Lockwood and others, 1997). Because this nonmigratory bird is restricted in its range, it was among the first species to be listed as endangered by the U.S. Fish and Wildlife Service (FWS) on March 11, 1967 (Pimm and Bass, 2002), and the marl prairies that it resides in are listed as critical habitat.

Maintenance and creation of suitable habitat is seen as the most important pathway to the persistence of the six existing sparrow subpopulations (fig. 1; Sustainable Ecosystems Institute, 2007); however, major uncertainties remain in how to increase suitable habitat within and surrounding these subpopulations, which are vulnerable to environmental stochasticity. An improved understanding of the relationships between environmental factors and sparrow habitat suitability is needed to guide restoration efforts.

The 2014 range-wide surveys conducted by ENP indicate the CSSS population (2,720 individuals) fell below a threshold level (2,915), thereby requiring the U.S. Army Corps of Engineers (USACE) to reinitiate consultation in November 2014 on the Everglades Restoration Transition Plan (ERTP), a regional operation plan for water management. The criterion for reinitiating consultation is called the Incidental Take Reinitiation Trigger, which states, "If the annual CSSS population estimate falls below 2,915 sparrows [mean population estimate 2001 to 2009 = 3,145 ± 230]), reinitiation of consultation must occur."

As part of the ERTP consultation process, the South Florida Water Management District (SFWMD) produced a set of hydrologic management scenarios (table 1) representing simulations of various operational actions that could be taken at water management structures (fig. 2) to improve conditions for the CSSS. Four scenarios (R2F, R2G2, R2H, R1E) and an existing condition baseline (ECB) were generated using 1965–2005 climatological data. Currently, consistently suitable conditions for the sparrow are only present in the most productive subpopulations B and E (Slater and others, 2009). The proposed water management scenarios are designed to lower water levels and improve habitat conditions in subpopulations A and D, raise water levels to improve habitat conditions in subpopulations C and F, and minimize impacts to subpopulations B and E. Our objective in this analysis was to compare these scenarios utilizing a set of metrics (short- to long-time scales) that relate habitat suitability to hydrologic conditions. The subset of metrics we present here were formulated through discussions with an interagency CSSS group (including representatives from FWS, ENP, and USACE) during a series of meetings in February 2016.

Methods

Sparrow surveys have been conducted by helicopter visits to sites located on a 1-kilometer (km) grid that encompassed any potential sparrow habitat (Kushlan and Bass, 1983). Observers recorded all sparrows detected over a 7-minute interval within about a 200-meter (m) radius of their set-down location. We used sparrow observations (from helicopter surveys from Mar–Jun, 1992–2015; n = 13,404) to estimate the spatial distribution of sparrow counts within ENP.

Using ArcMap (v. 10.3; ESRI, 2011), survey data from 2000–15 were overlain on water-depth data collected from the Everglades Depth Estimation Network (EDEN) on the same dates. EDEN is a nearly real-time integrated network that consists of over 240 water-level gages and provides daily water-depth data (within ±5 cm) in 400×400-m grid cells (Liu and others, 2009) and empirically accounts for evapotranspiration, rainfall, and sheetflow (Telis, 2006). From the EDEN data, a set of hydrologic variables were calculated over multiple temporal scales as proxies for landscape processes that may influence habitat suitability (table 2) and were used to evaluate the scenarios.

Defining Suitable Habitats—The current FWS target for a discontinuous, 1-year hydroperiod suitable for the sparrow is 90–210 days in order to maintain and promote formation of the marl prairie habitat upon which it relies (U.S. Fish and Wildlife Service, 2010). However, a running average of the prior 4-year hydroperiod (HP) may better reflect the temporal scale at which marl prairie habitat is created and sustained (Ross and others, 2006). Interannual variability in hydroperiod at a site (defined as one standard deviation around the mean 4-year hydroperiod [HP SD]) reveals additional information about hydrologic conditions potentially affecting sparrow habitat. We calculated quantiles of sparrow observations over the entire period of record for HP and HP SD (table 2) and defined suitable ranges as between the 25–75-percent quantile (middle 50 percent of sparrow observations). From these ranges, we mapped hydroperiod duration and variability across the landscape for each SFWMD Regional Simulation Model (RSM) scenario (mean; 1968–2005). Here we assumed that relationships defined using EDEN data can be transferred to the RSM. Although both methods have been independently validated, no crosswalk currently exists to explicitly link them. We also mapped the mean change in hydroperiod of each scenario relative to the ECB. In addition, we calculated consecutive dry days (CDD) within the breeding season, a metric the FWS uses to indicate habitat conditions that allow for multiple breeding attempts in one season (greater than 90 days; U.S. Fish and Wildlife Service, in press).

We examined the geographic proportion of each subpopulation that met the FWS targets for HP and CDD (table 2) for each scenario year 1968–2005 and 1965–2005, respectively. Across this time span, we then identified the frequency of years for each scenario in which 40 percent of each subpopulation met the targets (a defined FWS goal; U.S. Fish and Wildlife Service, in press).

Defining New Subpopulation Boundaries—The historic location boundaries of the six CSSS subpopulations (fig. 1) were delineated by the U.S. Fish and Wildlife Service (2007).We mapped the frequency (from 2000–15) that each EDEN cell met both the HP and HP SD criteria (see Results) to identify “hydroperiod suitable” areas that may lie outside of these sparrow subpopulation boundaries. We classified cells around subpopulation A that met both hydroperiod criteria greater than 25 percent of years as additional hydroperiod suitable areas and included these cells in newly defined boundaries for the subpopulation (A1 and A2, fig. 2). The FWS has identified a target size of 24,000 acres of habitat that should meet their hydrologic metrics (greater than 90 consecutive dry days and 90–210 days of discontinuous hydroperiod) within the expanded boundary (U.S. Fish and Wildlife Service, in press). Using our newly defined boundaries, we calculated the area of subpopulation A (1968–2005 for HP, 1965-2005 for CDD) meeting the targets to determine the number of years for each scenario in which the area exceeded 24,000 acres.

Associating Mean Subpopulation Water Depth with Sparrow Abundance—Sparrow survey data from 2000–15 were used to identify the number of sparrows detected in a given EDEN cell on a given day. The mean water depths for the subpopulation area containing this cell were then averaged over all detections. We then plotted the average water depth value for the subpopulation area against the sum of bird occurrences over the 16-year time period to determine mean water depths associated with increased sparrow abundance in the subpopulation area. The mean depths corresponding to highest abundance (2000–15) were defined as the most suitable. These depth values were used to evaluate the shifts in depth distribution observed between the ECB and each scenario. To compare the baseline to each scenario, kernel probability distribution curves were computed that represent the water-depth histograms. The kernel distribution curve is computed by summing the component smoothing functions for each data value to produce a smooth, continuous probability curve (SAS Institute, 2010). A scenario was considered more suitable than the ECB if there was an increased frequency of “suitable” breeding season water depths.

Results

Across all subpopulations, where 1–3 sparrows were observed, the 25–75-percent quantile range contained sites having an approximate 104- to 203-day HP; where 4–5 sparrows were observed, the middle 50 percent was within an approximate 21- to 218-day HP, and where 6 sparrows were observed, the middle 50 percent was within an approximate 25- to 90-day HP (fig. 3). Subsequent analyses use the FWS-defined metric of 90–210 days to be consistent with the 2010 Biological Opinion for the CSSS (U.S. Fish and Wildlife Service, 2010). Across all bird counts, the middle 50 percent of sparrow observations were located in sites having an HP SD range of about 17–43 days (fig. 4). Based on these assessments, the following analyses code a 17–43 day SD as “suitable,” with higher variability decreasing suitability (associated with declining sparrow use; fig. 5). The highest count of sparrows observed at a site (2000–15) occurred at a mean subpopulation water depth of -20 to -50 centimeters (cm) (fig. 6).

Under all scenarios (R2F, R2G2, R2H, R1E) HP decreased near subpopulation A and increased in subpopulation F compared to that of the ECB. The interannual variability in hydroperiod (HP SD) increased the most under R1E and the least under R2H relative to the ECB (figs. 7–10).

The FWS target of 24,000 acres of suitable hydroperiod (90–210 days) in subpopulation A was only met during periods having below-average rainfall (fig. 11): 1973–79 and 1990–92 (fig. 12; all scenarios). For the R2H scenario, the target was met during an additional 5 years (1980, 1981, 1982, 1989, 2004). Correspondingly, for all scenarios, daily mean water depths decreased relative to the ECB in subpopulation A during both the early (Mar–Apr) and late (May–July 15) breeding season (figs. 13–16*A*, *B*). Where a scenario has kernel values that exceed the baseline, there is an increased frequency of depths across that range; higher values from -20 to -50 cm show increased “suitability” for the sparrow. Daily differences in mean subpopulation water depth during the breeding season for the 1965 to 2005 period are shown in figures 13*C*–16*C*. Negative values indicate a scenario has decreases in mean water depth relative to the baseline, and positive values indicate a scenario has increases in depth. Scenario R2H produced the greatest number of years in which scenario water depths were lower than ECB water depths in subpopulation A (figs. 13*C*–16*C*). The FWS target of consecutive dry days (CDD; > 90 days) was met in 8 years in all scenarios (fig. 17).

Increases in HP affecting the eastern subpopulations were highest in scenario R1E followed by R2F and R2G2, and then R2H (figs. 7–10). The increase in water volume (relative to the ECB) tended to increase water depths in the reverse order of scenarios in subpopulation E, with the least disruption to sparrow breeding depths provided by the R2H scenario (figs. 18–21). The HP target was met by all scenarios during 23 of 38 years (61 percent) and during an additional 3 years under the ECB (fig. 22*E*), whereas the CDD target was only met during 10 of 40 years (25 percent; all scenarios) and during 1 additional year under R2H (1980; fig. 23*E*).

For subpopulation B, HP and mean water depths remained more stable, with depths varying ±2 cm or less from the baseline (figs. 24*C* –27*C*). There were little differences in performance across scenarios in subpopulation B, meeting targets for HP (fig. 22*B*) and CDD (fig. 23*B*) during 32 of 38 years (84 percent) and 18 of 40 years (45 percent), respectively.

In subpopulation F, the lengthening of HP relative to ECB was most pronounced in R1E, followed by R2F; the top two performing scenarios during 20 of 38 (53 percent) years (fig. 22*F*). R2G2 and R2H performed better than the baseline in approximately half of the scenario years (fig. 22*F*). Although there was little change in HP between R2H and ECB in subpopulation F, R2H was the only proposed scenario in which mean water depth decreased (mean –3.22 cm, range -21.29 to 5.56 cm; fig. 28) during the early- and late-season breeding period (figs. 29–32), leading to an increased frequency of unsuitable sparrow subpopulation water depths of less than -50 cm (fig. 6). This disparity of results between long- and short-term metrics suggests that despite an extension in hydroperiod, there was a decrease in water-depth suitability within the sparrow’s breeding season. The CDD target was met in 13 of 40 years (33 percent) in all scenarios and an additional 1 year in ECB and R2H (1998; fig. 23*F*).

For subpopulation C, R1E and R2F provided the most benefit relative to ECB during periods considered excessively dry (for example, shorter HP) for the sparrow (for example, 1973–82; fig. 22*C*). During periods having above average rainfall, R2H provided the best scenario HP outcome during 17 of 38 years (45 percent; fig. 22*C*) and provided a slight increase in the CDD metric (fig. 23*C*), exceeding all other scenarios during 25 of 40 years (63 percent). Similar to subpopulation F, water depths decreased during the breeding season relative to ECB under R2H only, contributing to a higher frequency of mean depths within an unsuitable depth range (less than -50 cm) in both the early- and late-breeding season (figs. 33–36). This again demonstrates the value of examining metrics across multiple time scales because increases in the HP metric under R2H would only be considered a positive outcome with corresponding increases in the frequency of breeding season water depths in the suitable range (-20 to -50 cm).

Farthest to the southeast of ENP in subpopulation D, the HP target was only met during the 12 driest years (fig. 11) under all scenarios, during an additional 5 average years under ECB, and during an additional 2 dry years under R2H (fig. 22*D*). The CDD target was met during 4 years for ECB and an additional 2 years under R2H only (fig 24*D*). Further, the interannual variation in hydroperiod (HP SD) was substantially reduced with R2H (figs. 7–10*C*). In scenarios R1E, R2F, and R2G2, the frequency of unsuitable mean water depths (greater than -20 cm) increased in the early breeding season, whereas the frequency of greater depths decreased under R2H (figs. 37–40). In addition, R2H was the only scenario in which there was a consistent reduction in breeding season water depths in most years (fig. 39*C*).

Summary and Conclusions

Currently, consistently suitable conditions for the Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) are only present in subpopulations B and E. The water management scenarios evaluated herein were intended to lower water levels and improve habitat conditions in subpopulation A and D, raise water levels to improve habitat conditions in subpopulations C and F, and minimize impacts to subpopulations B and E. Although hydrologic outputs are similar across scenarios in subpopulation A, scenario R2H reaches the hydroperiod (HP) and depth suitability targets more than the other scenarios relative to ECB, while minimizing negative consequences to subpopulation E. However, although R2H hydroperiods are longer than those for ECB during the wet season in subpopulations C and F, depths during the breeding season are predicted to decrease in suitability (less than -50 cm) relative to existing conditions.

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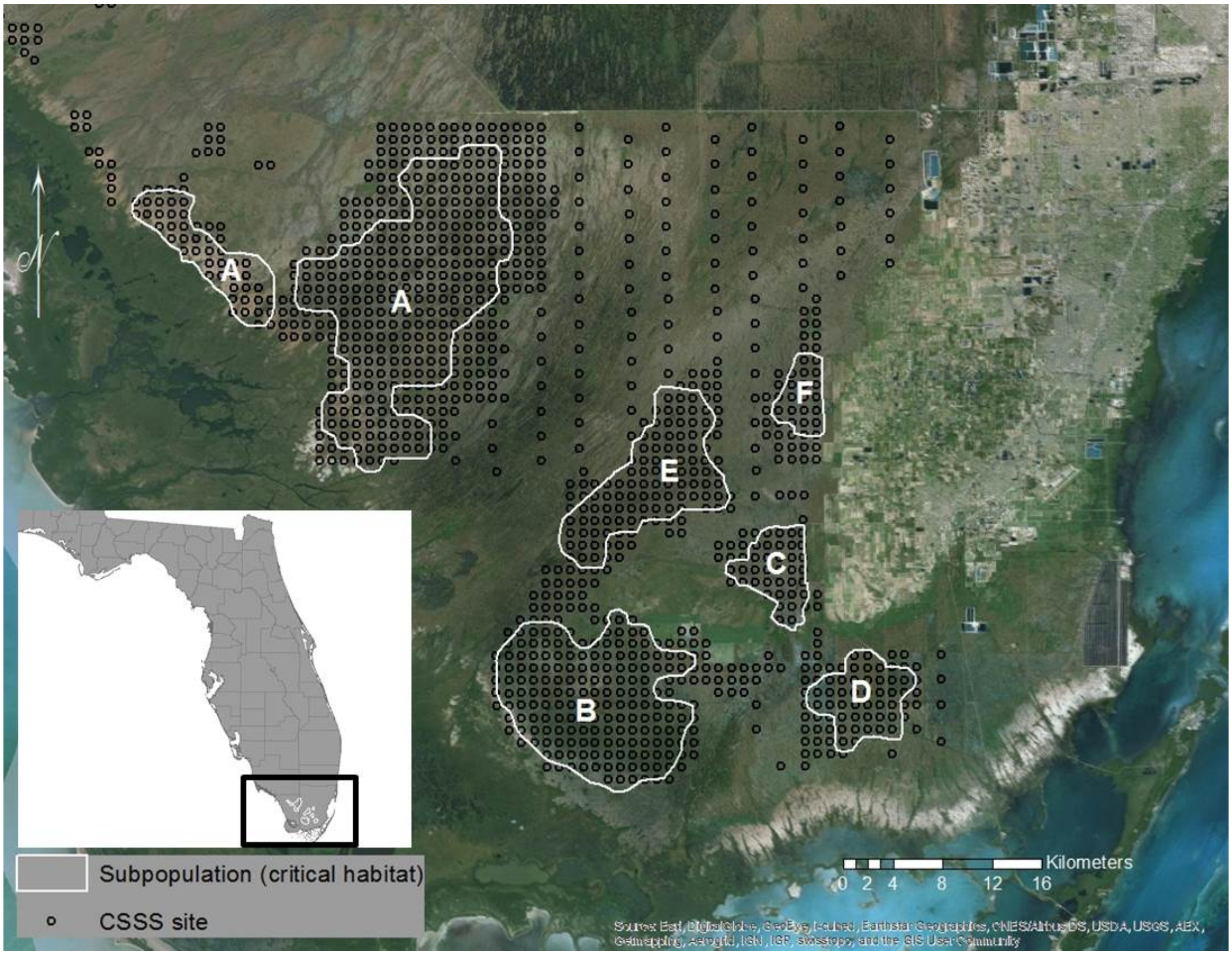


Figure 1. Map of south Florida study area displaying Cape Sable seaside sparrow (CSSS) critical habitat subpopulations and survey sites.

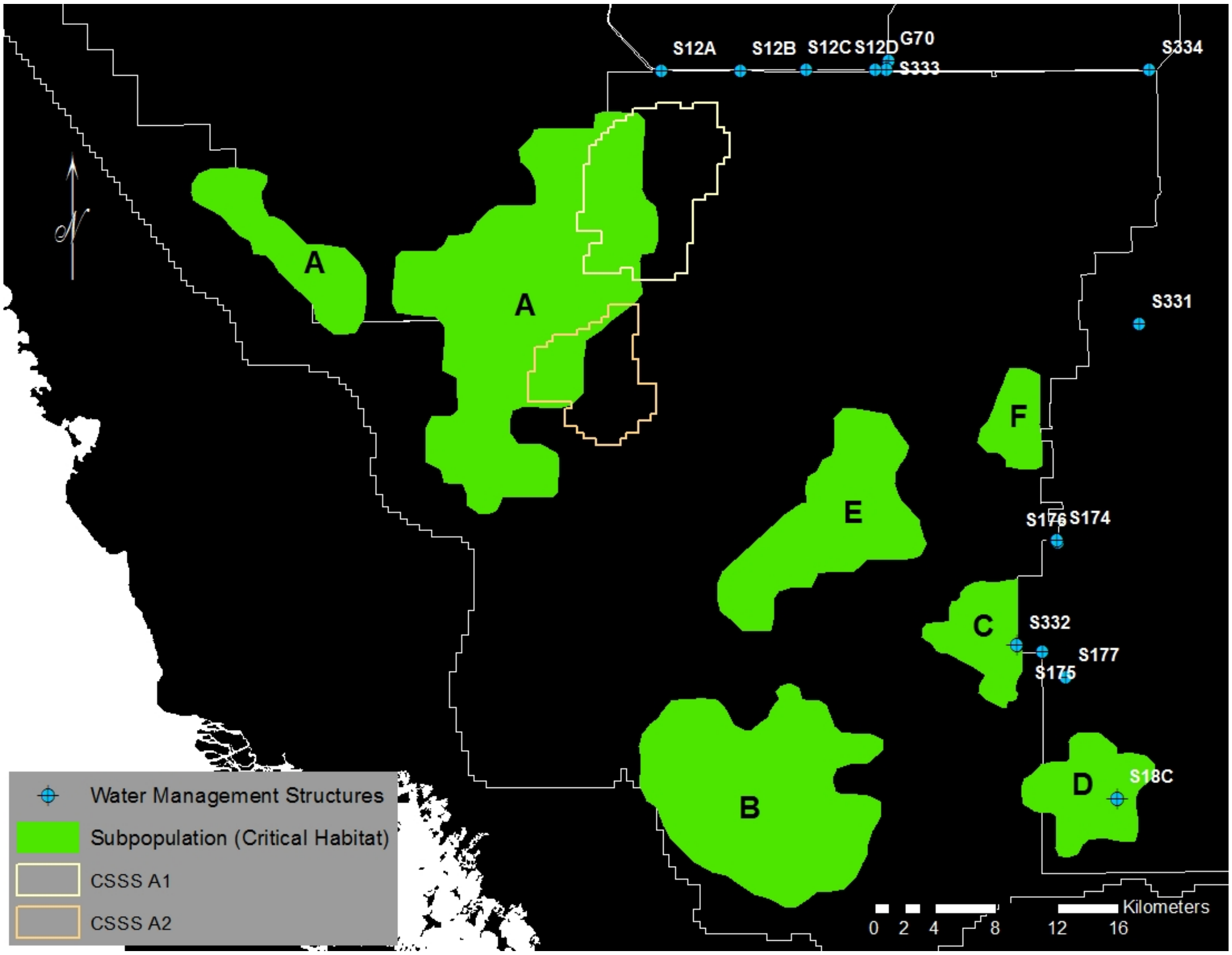


Figure 2. Map showing locations of water management structures, Cape Sable seaside sparrow (CSSS) critical habitat subpopulations, and newly defined boundaries for the subpopulation A (A1 and A2).

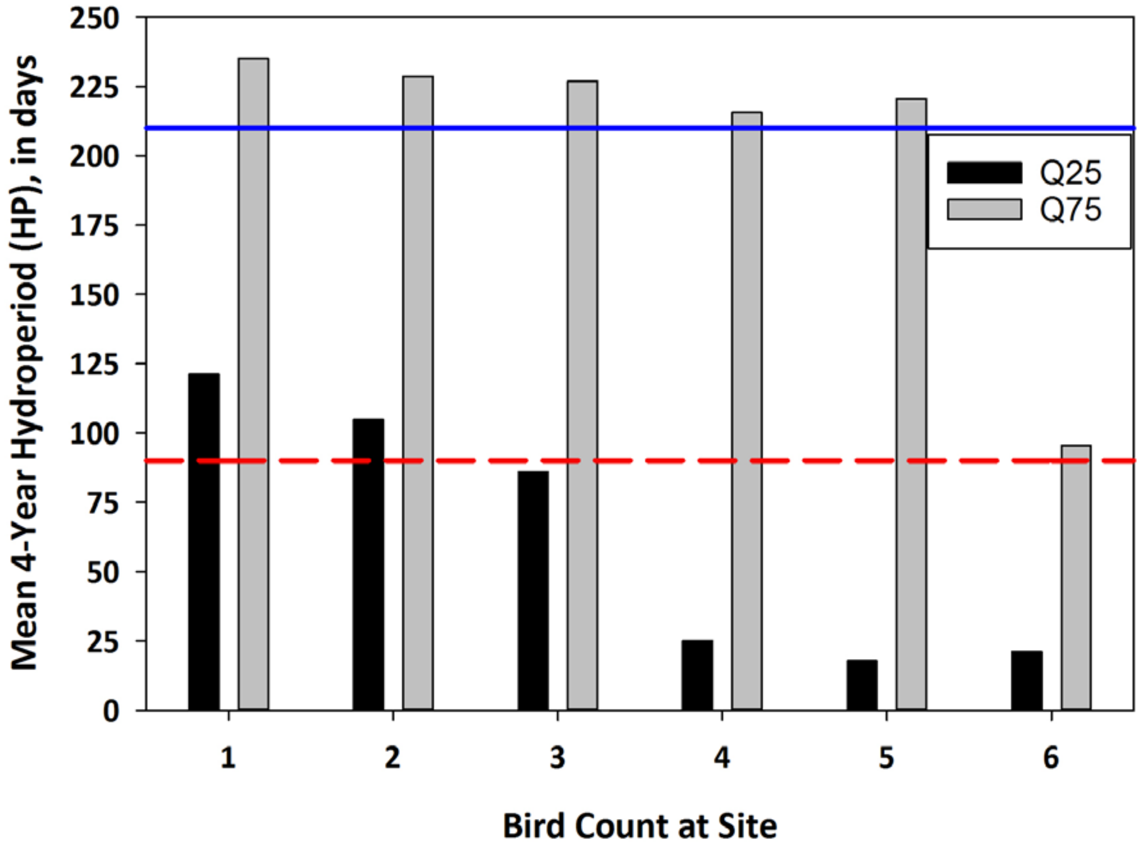


Figure 3. Graph comparing mean 4-year hydroperiod to bird count at study sites. For Cape Sable Seaside sparrow counts of 1-6, 50 percent of sparrow observations (25–75-percent quantile [Q25–Q75]) are located at sites having a 4-year mean hydroperiod (prior to detection) between the black and the grey bars. Everglades Depth Estimation Network (EDEN) hydroperiods of less than 90 days support many (4-6) birds. The area between the dashed red line and solid blue line represents the 90- to 210-day range.

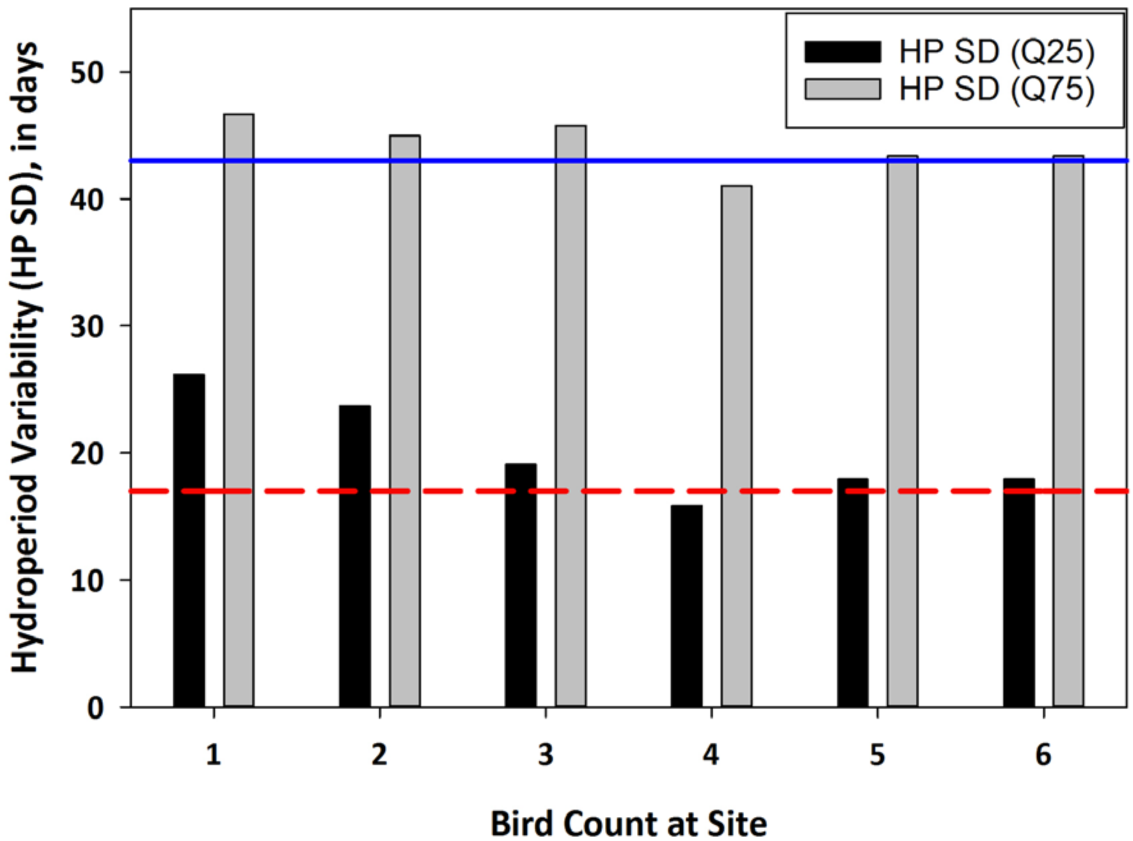


Figure 4. Graph comparing mean 4-year hydroperiod variability (HP SD) to bird count at study sites. Fifty percent of the Cape Sable Seaside sparrows observed (25–75-percent quantile) are located at sites with 4-year hydroperiod variability between the black and the grey bars. The area between the dashed red line and solid blue line represents the 17- to 43-day range.

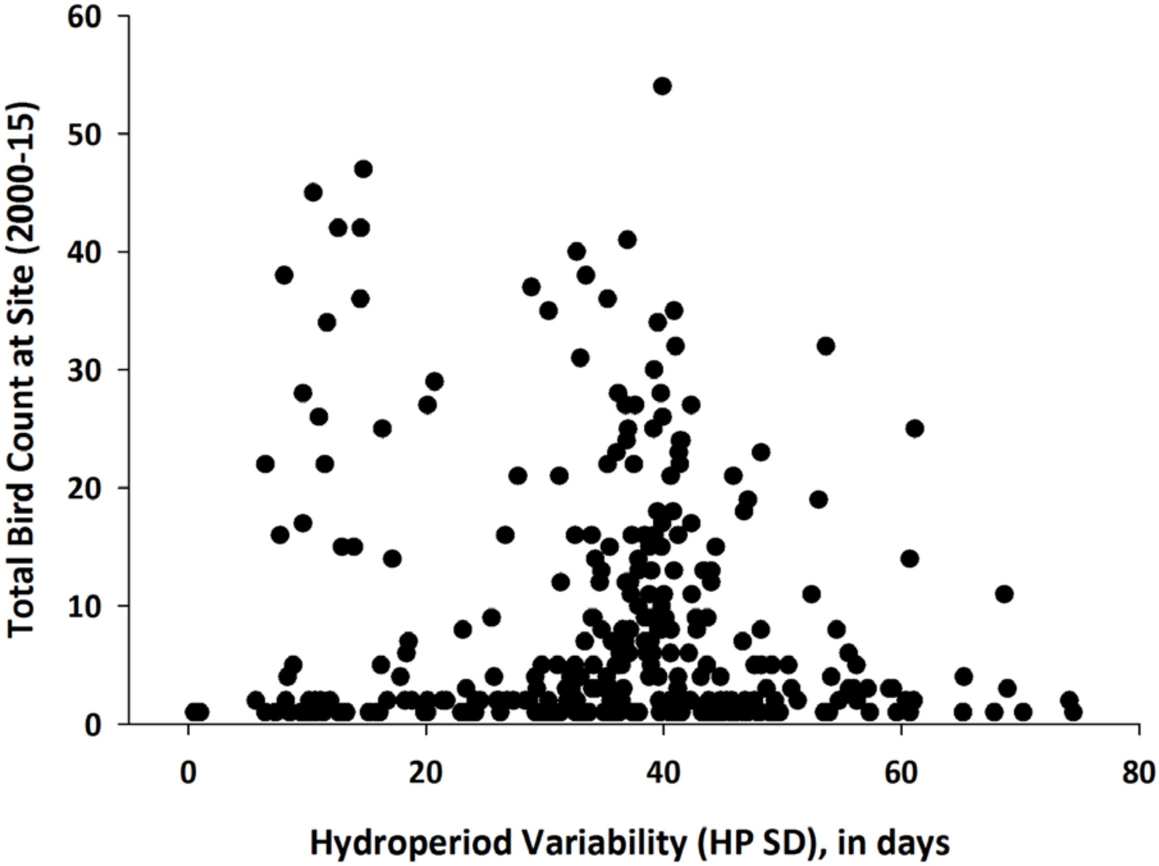


Figure 5. Graph showing the sum of Cape Sable seaside sparrow observations over the period of record (2000–15) at a given site compared to hydroperiod interannual variability (HP SD); declining sparrow abundance is associated with higher interannual variability.

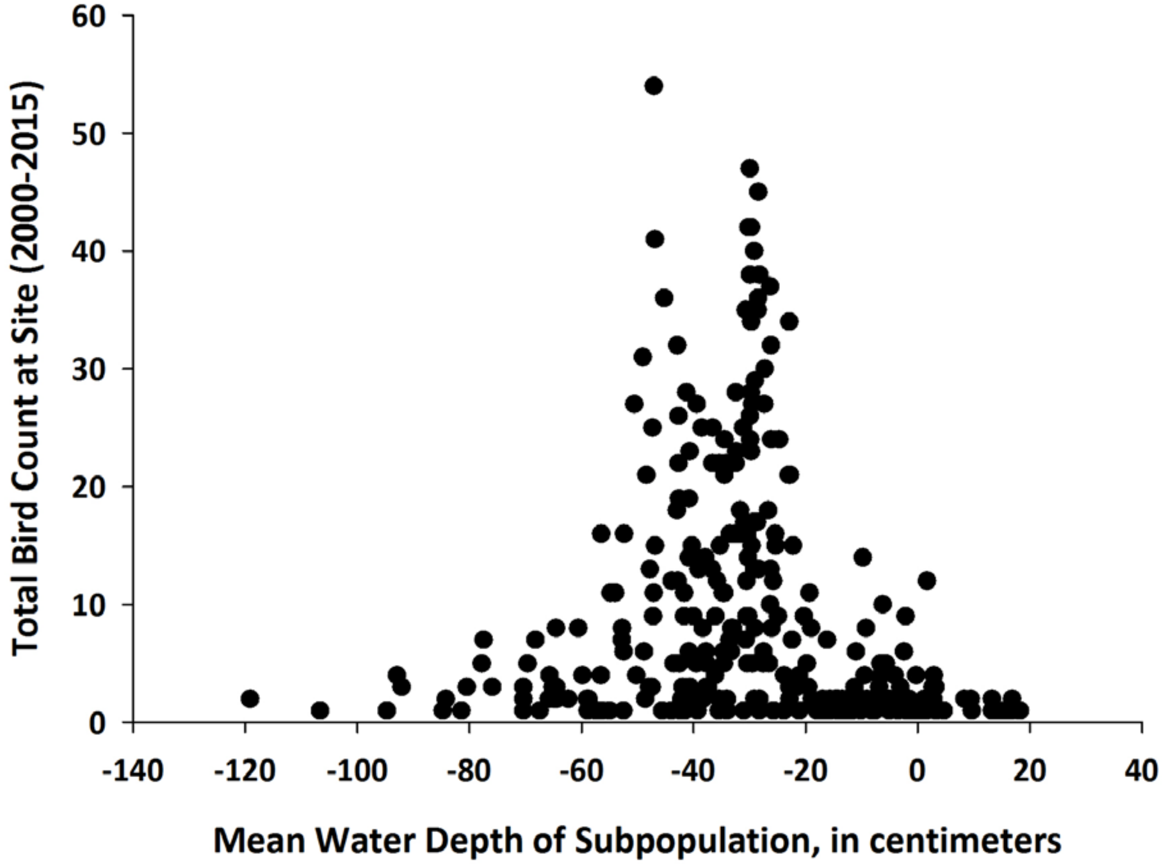


Figure 6. Graph showing the sum of Cape Sable seaside sparrow observations over the period of record (2000–15) at a given site compared to mean subpopulation water depth. Sparrow survey data were used to identify the number of sparrows detected in a given Everglades Depth Estimation Network (EDEN) cell on a given day. The mean water depths for the subpopulation area containing this cell were averaged over all detections, under the assumption that mean depth would converge on suitable values the more a cell was frequented.

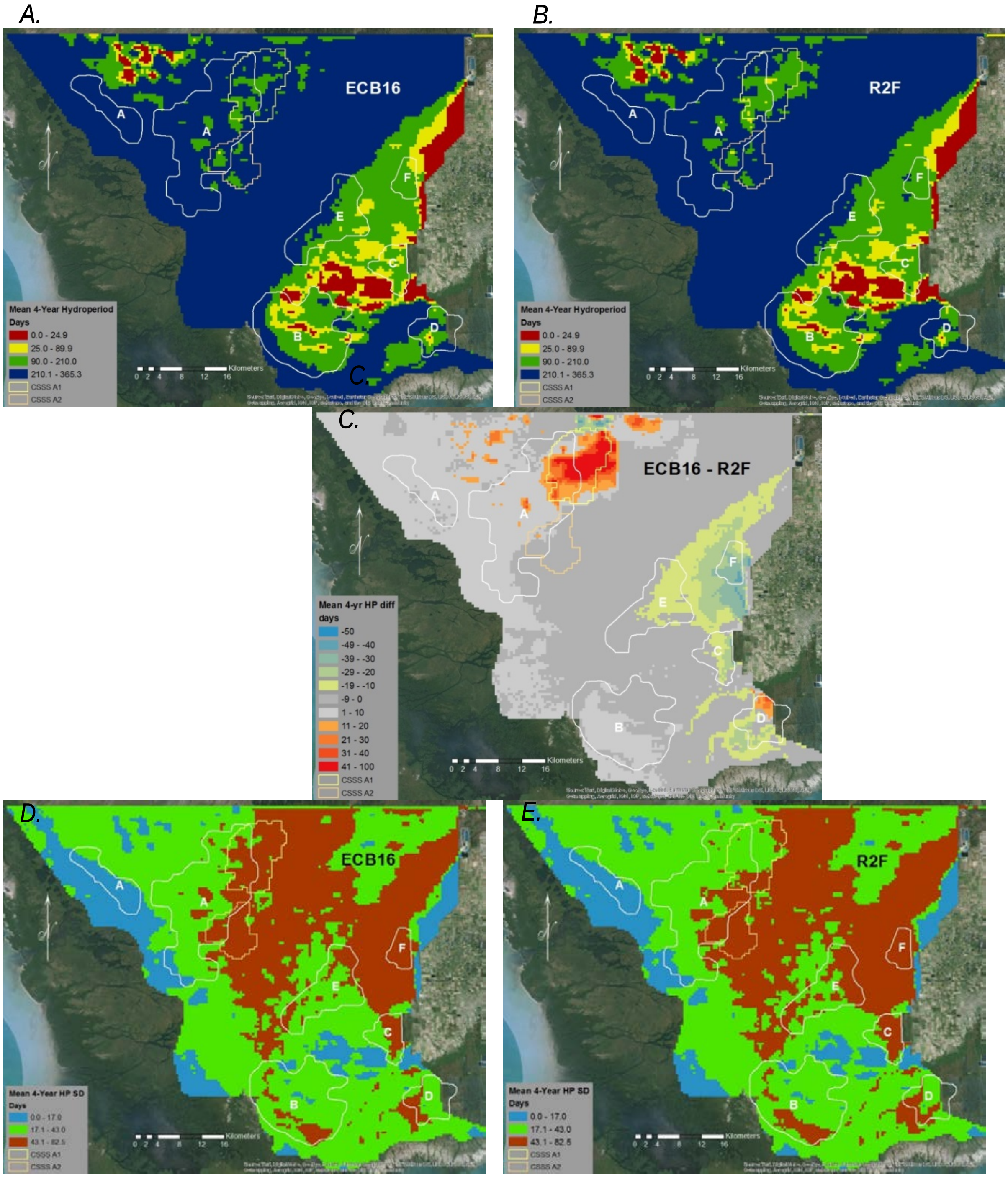


Figure 7. Maps showing, *A*, mean 4-year hydroperiod of baseline (1968–2004) condition, *B*, R2F scenario, *C*, difference between baseline and scenario, *D*, 4-year hydroperiod variability of baseline condition, and *E*, 4-year hydroperiod variability of scenario condition for Everglades National Park. Boundaries of Cape Sable seaside sparrow (CSSS) subpopulations A-F and populations A1 and A2 are denoted on the map.

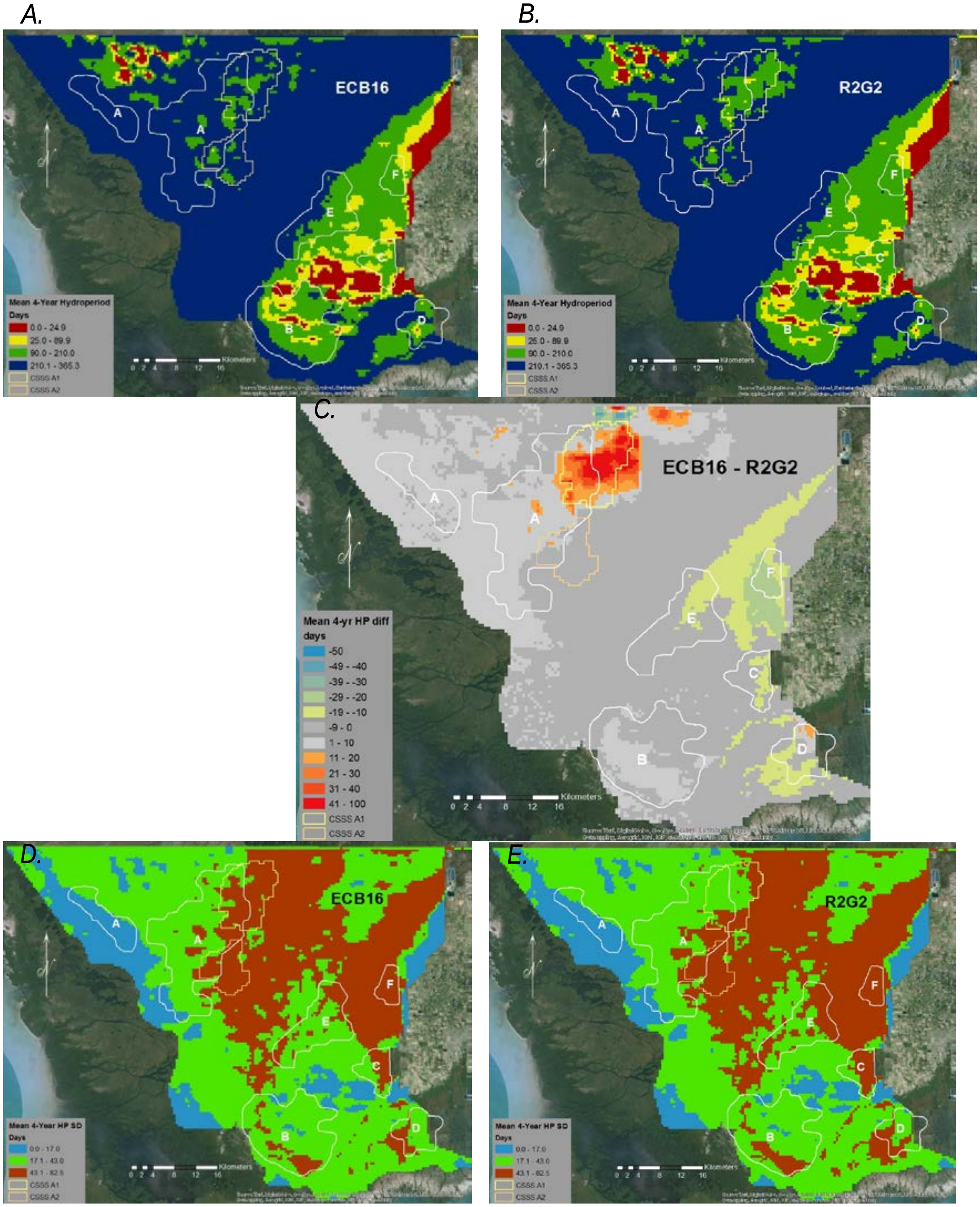


Figure 8. Maps showing, *A*, mean 4-year hydroperiod of baseline (1968–2004) condition, *B*, R2G2 scenario, *C*, difference between baseline and scenario, *D*, 4-year hydroperiod variability of baseline condition, and *E*, 4-year hydroperiod variability of scenario condition for Everglades National Park. Boundaries of Cape Sable seaside sparrow (CSSS) subpopulations A-F and populations A1 and A2 are denoted on the map.

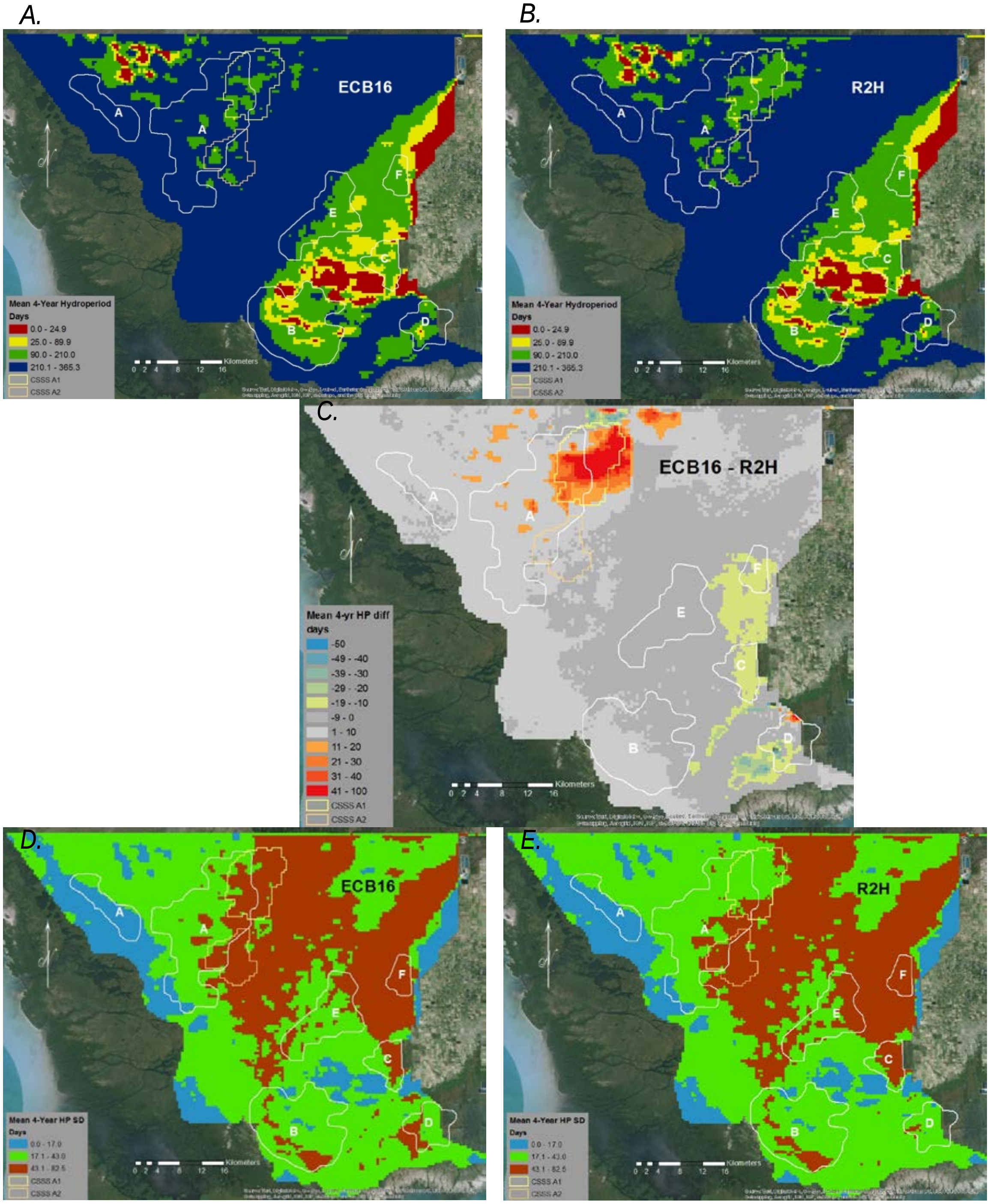


Figure 9. Maps showing, *A*, mean 4-year hydroperiod of baseline (1968–2004) condition, *B*, R2H scenario, *C*, difference between baseline and scenario, *D*, 4-year hydroperiod variability of baseline condition, and *E*, 4-year hydroperiod variability of scenario condition for Everglades National Park. Boundaries of Cape Sable seaside sparrow (CSSS) subpopulations A-F and populations A1 and A2 are denoted on the map.

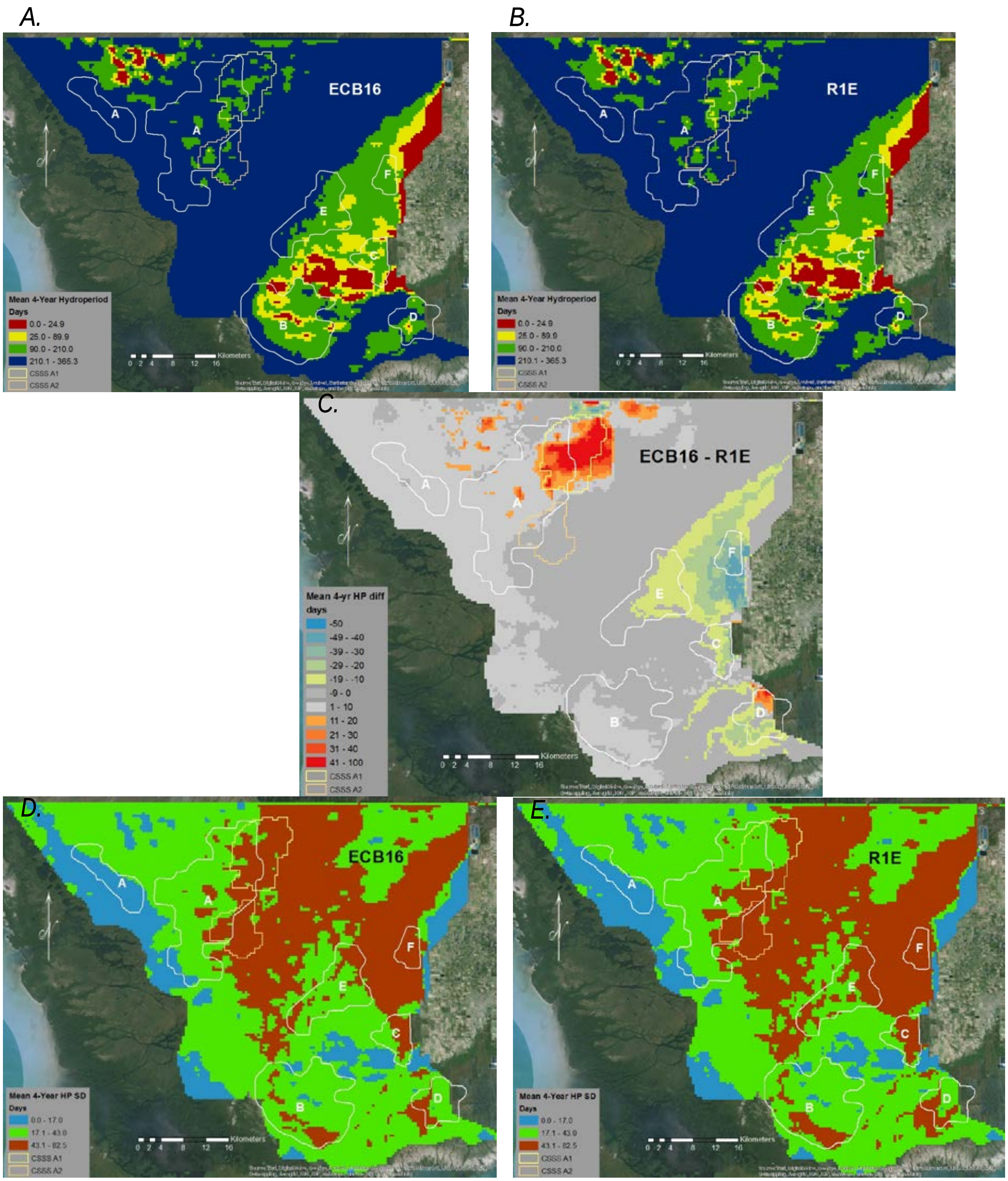


Figure 10. Maps showing, *A*, mean 4-year hydroperiod of baseline (1968–2004) condition, *B*, R1E scenario, *C*, difference between baseline and scenario, *D*, 4-year hydroperiod variability of baseline condition, and *E*, 4-year hydroperiod variability of scenario condition for Everglades National Park. Boundaries of Cape Sable seaside sparrow (CSSS) subpopulations A-F and populations A1 and A2 are denoted on the map.

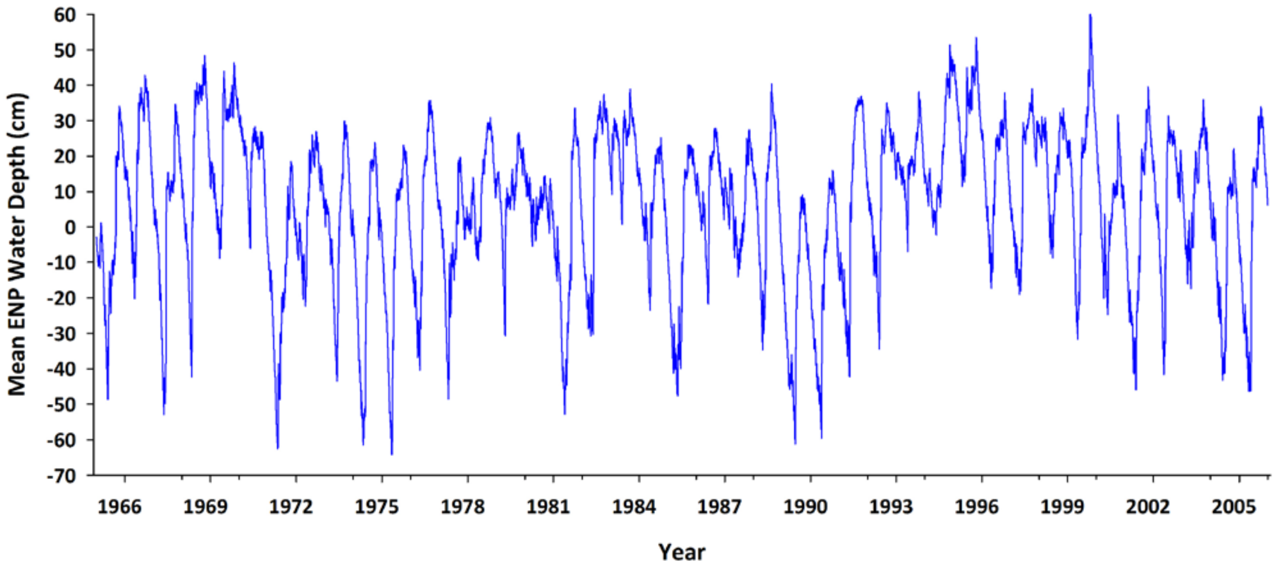


Figure 11. Graph showing mean water depth (1965–2005) for Everglades National Park (ENP) existing conditions baseline (ECB) run produced by the South Florida Water Management District (SFWMD) Regional Simulation Model (RSM). [cm, centimeter]

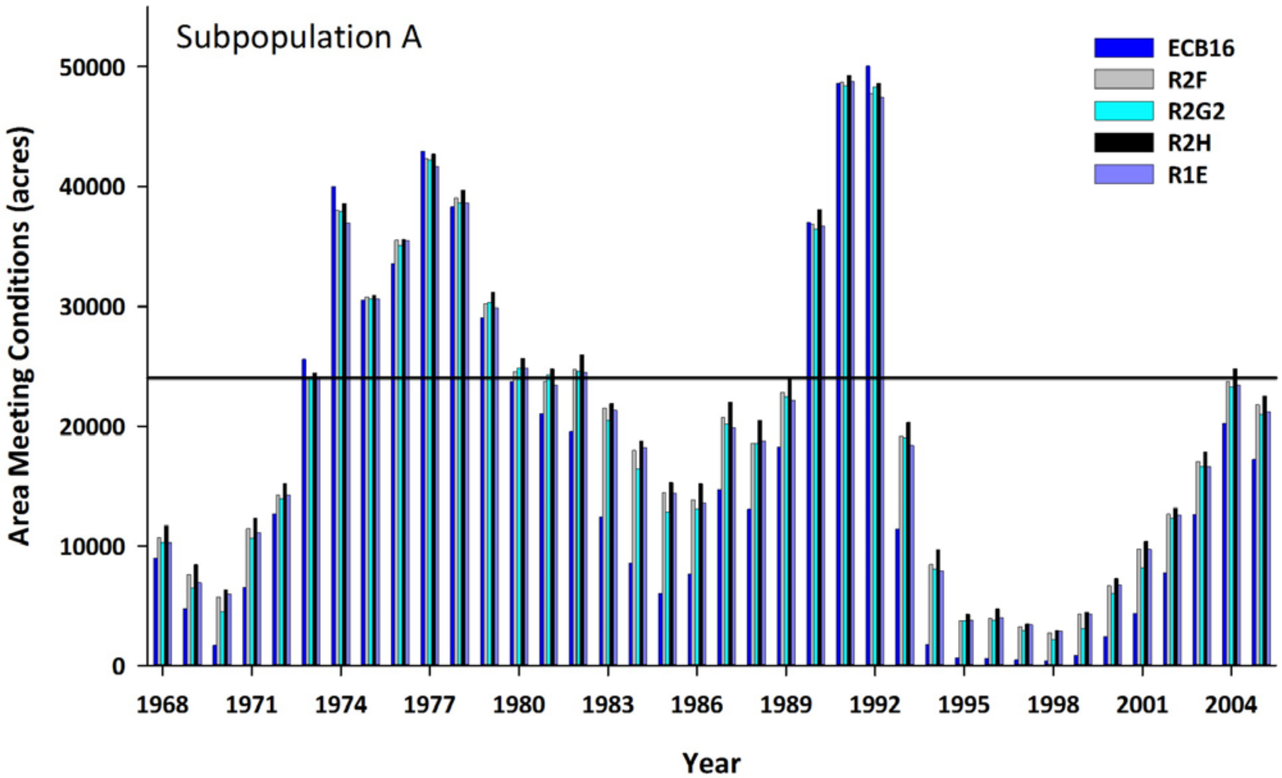


Figure 12. Graph showing area within subpopulations A, A1, and A2 (1968–2005) meeting FWS target 4-year hydroperiod of 90–210 days for 4 scenarios (R2F, R2G2, R2H, R1E) and the baseline condition (ECB).

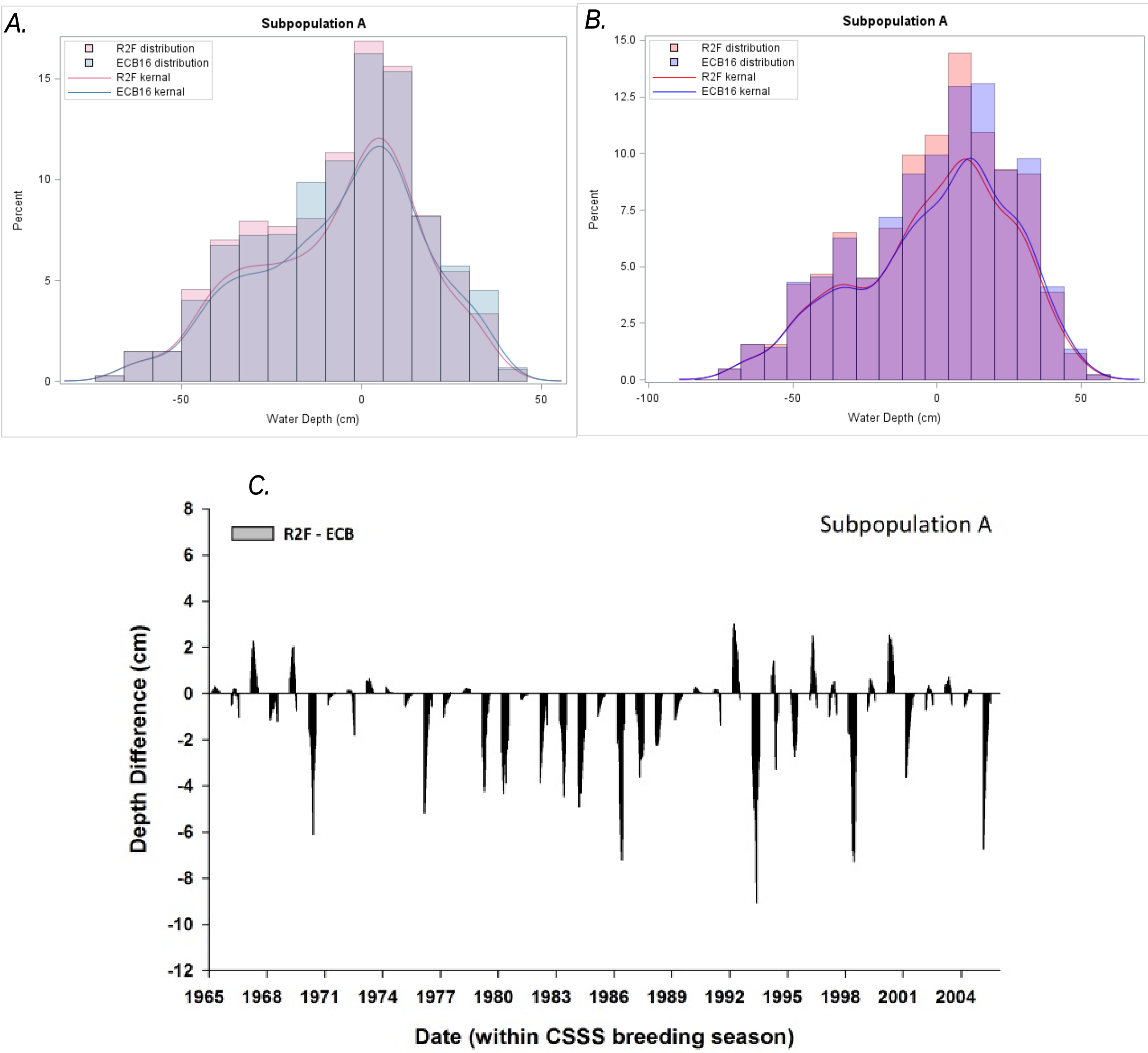


Figure 13. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference for R2F scenario and baseline condition for the R2F scenario, in subpopulation A. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

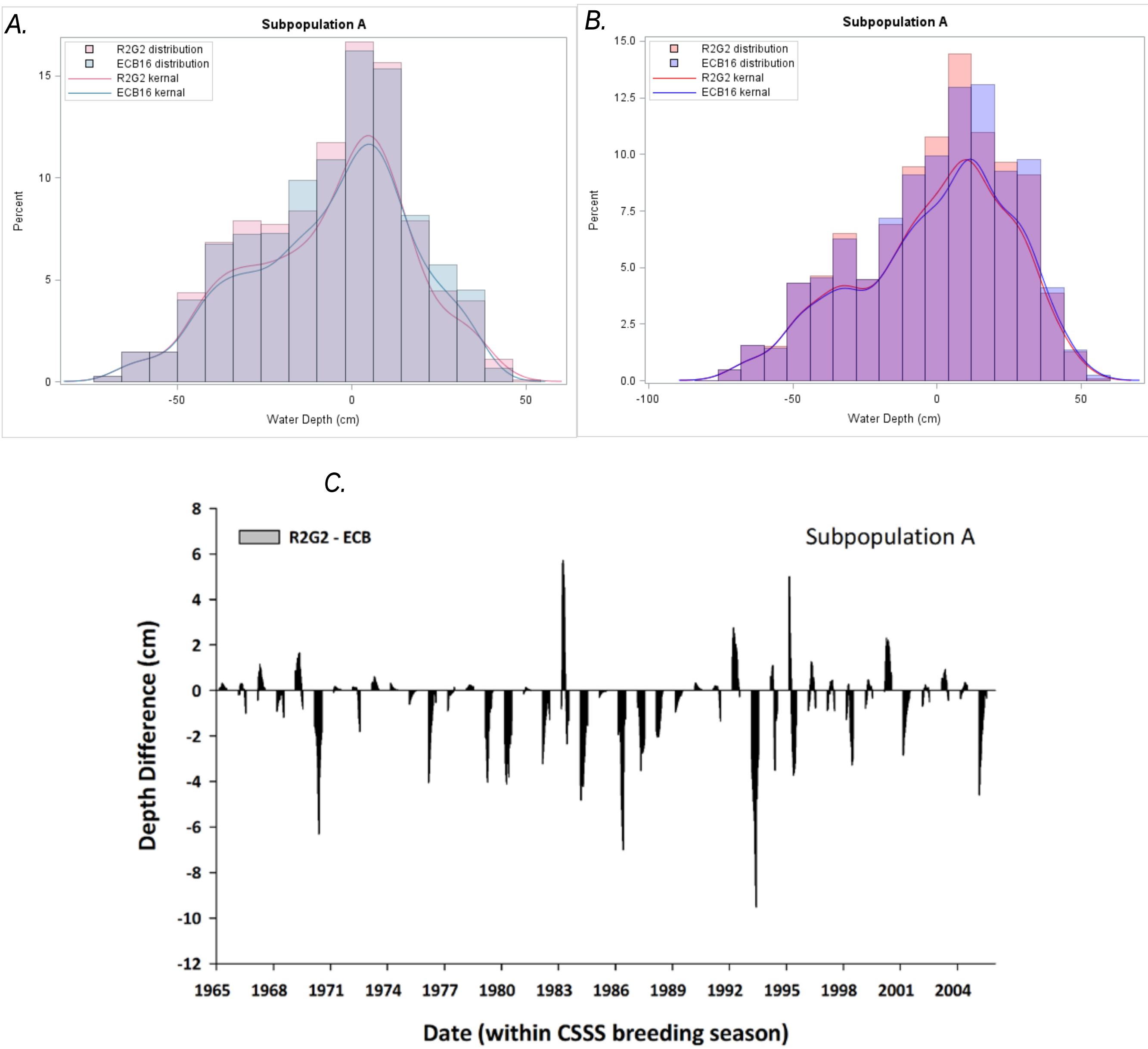


Figure 14. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2G2 scenario and baseline condition (ECB), in subpopulation A. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

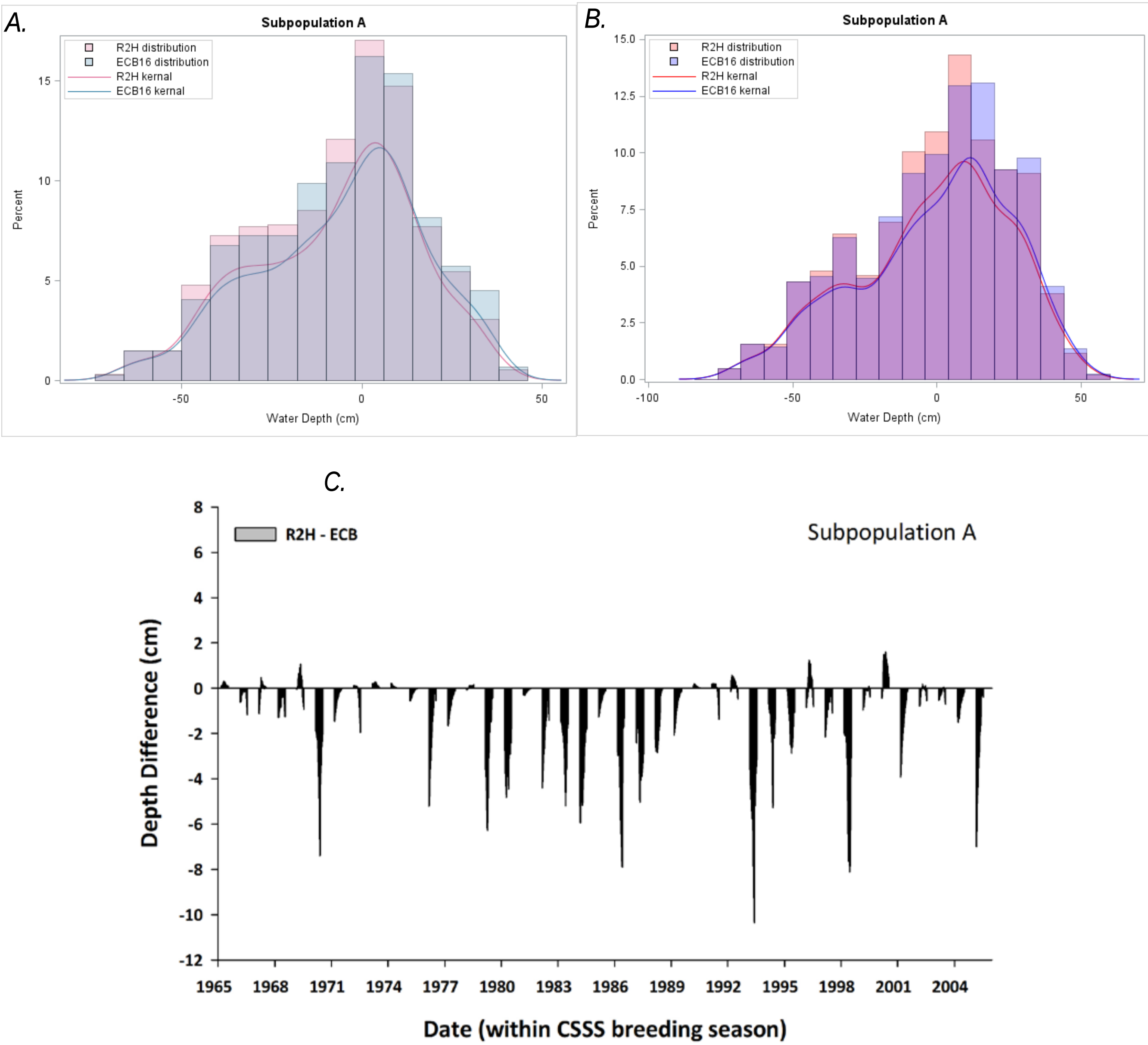


Figure 15. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2H scenario and baseline condition (ECB), in subpopulation A. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

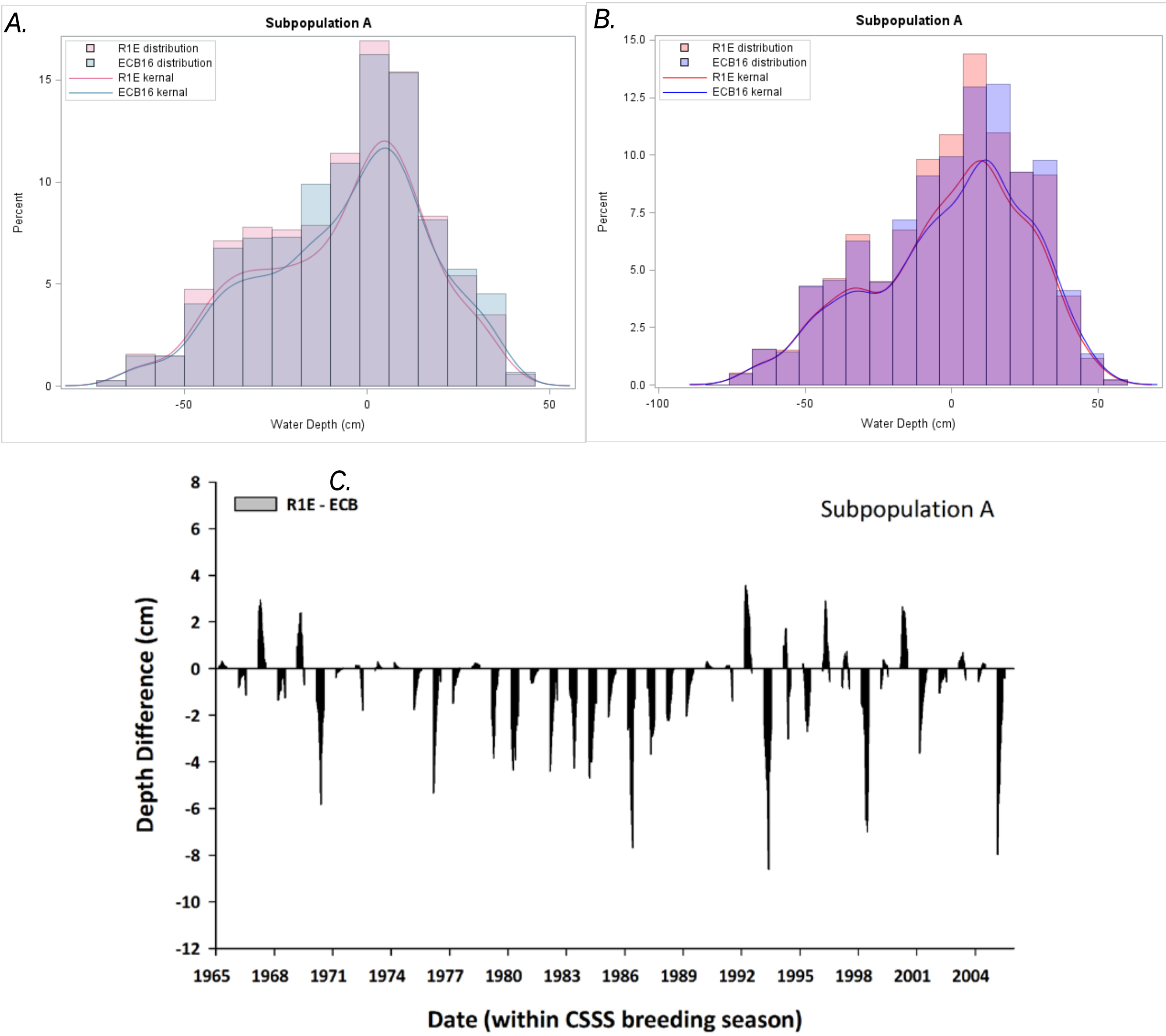


Figure 16. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R1E scenario and baseline condition (ECB), in subpopulation A. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

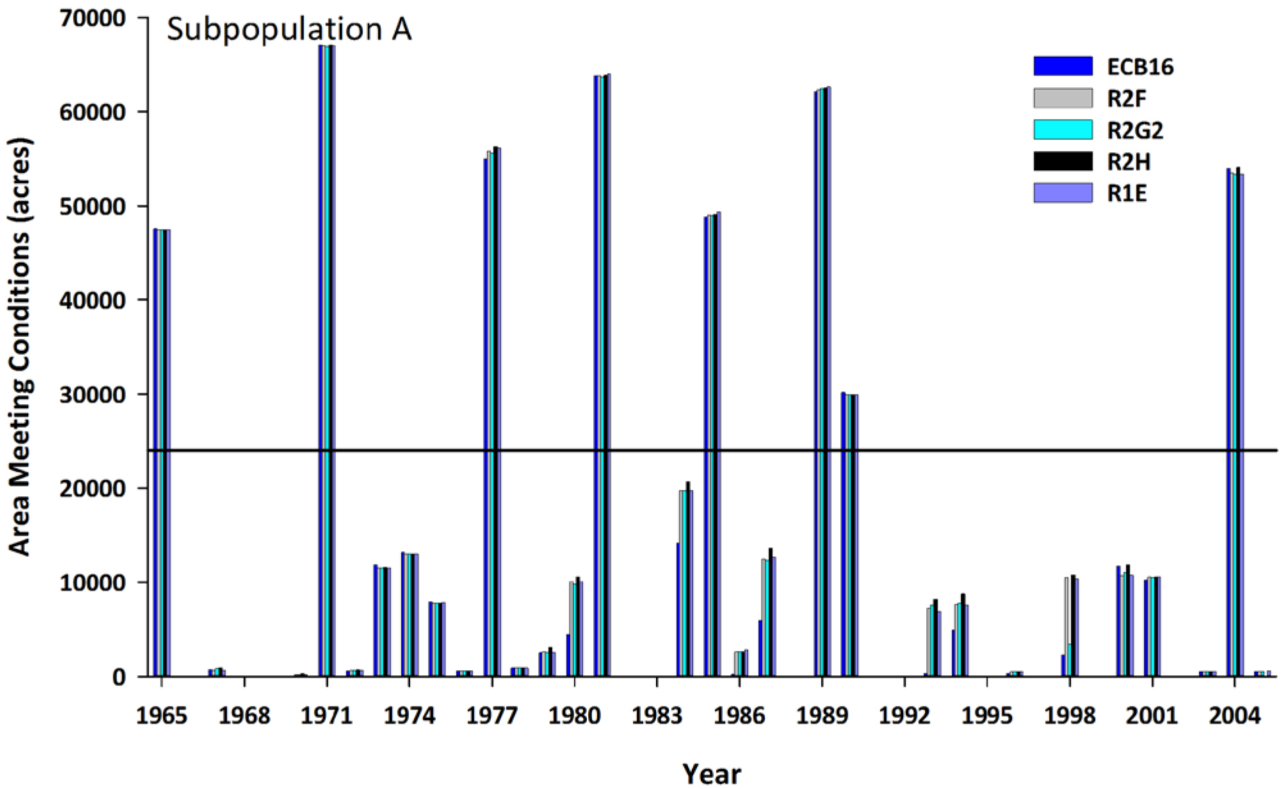


Figure 17. Graphs showing area within subpopulations A, A1, and A2 (1965–2005) meeting FWS target of more than 90 consecutive dry days within the breeding season (Mar 1–Jul 15) for four scenarios (R2F, R2G2, R2H, R1E) and the baseline condition (ECB).

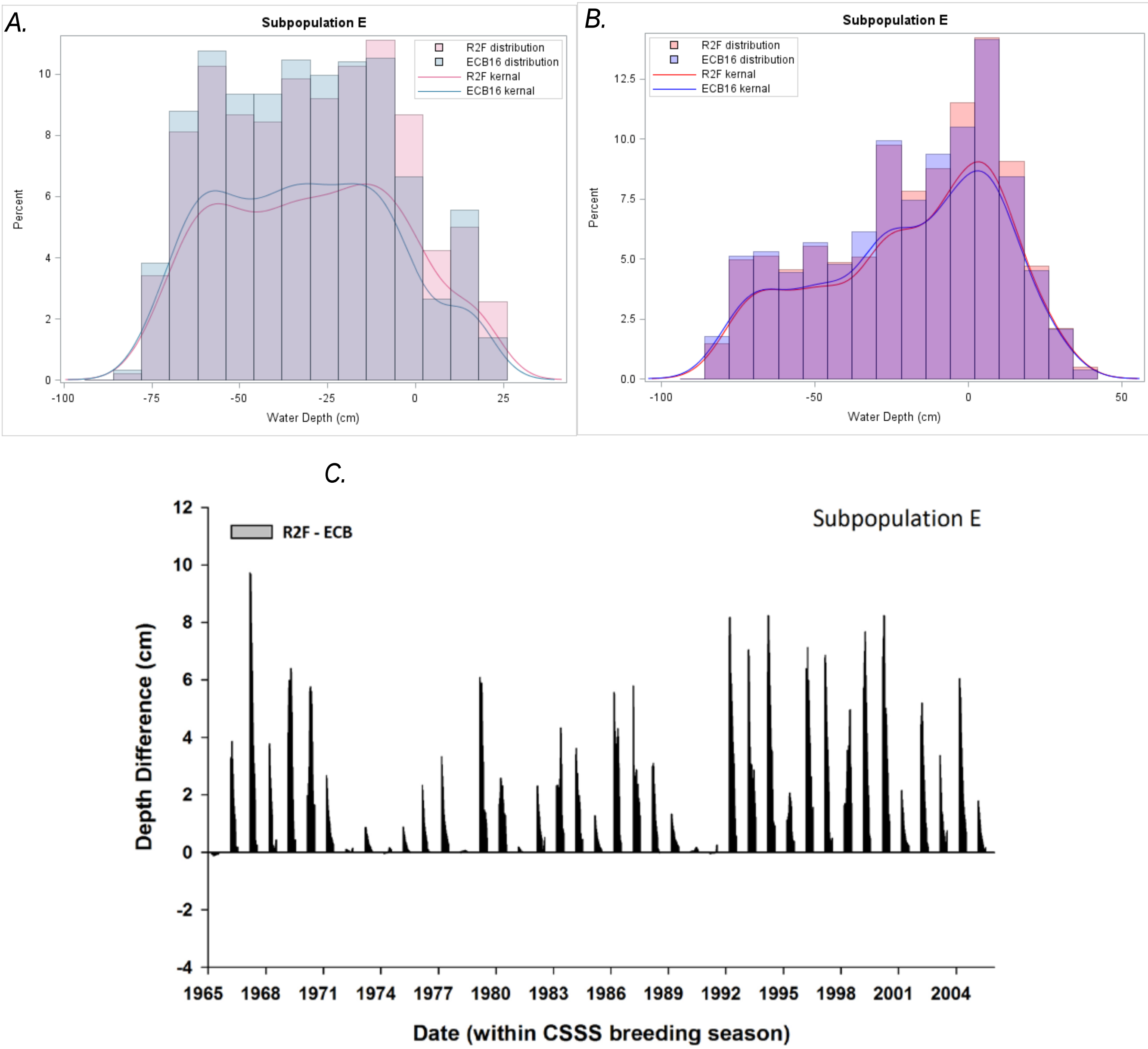


Figure 18. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2F scenario and baseline condition (ECB), in subpopulation E. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

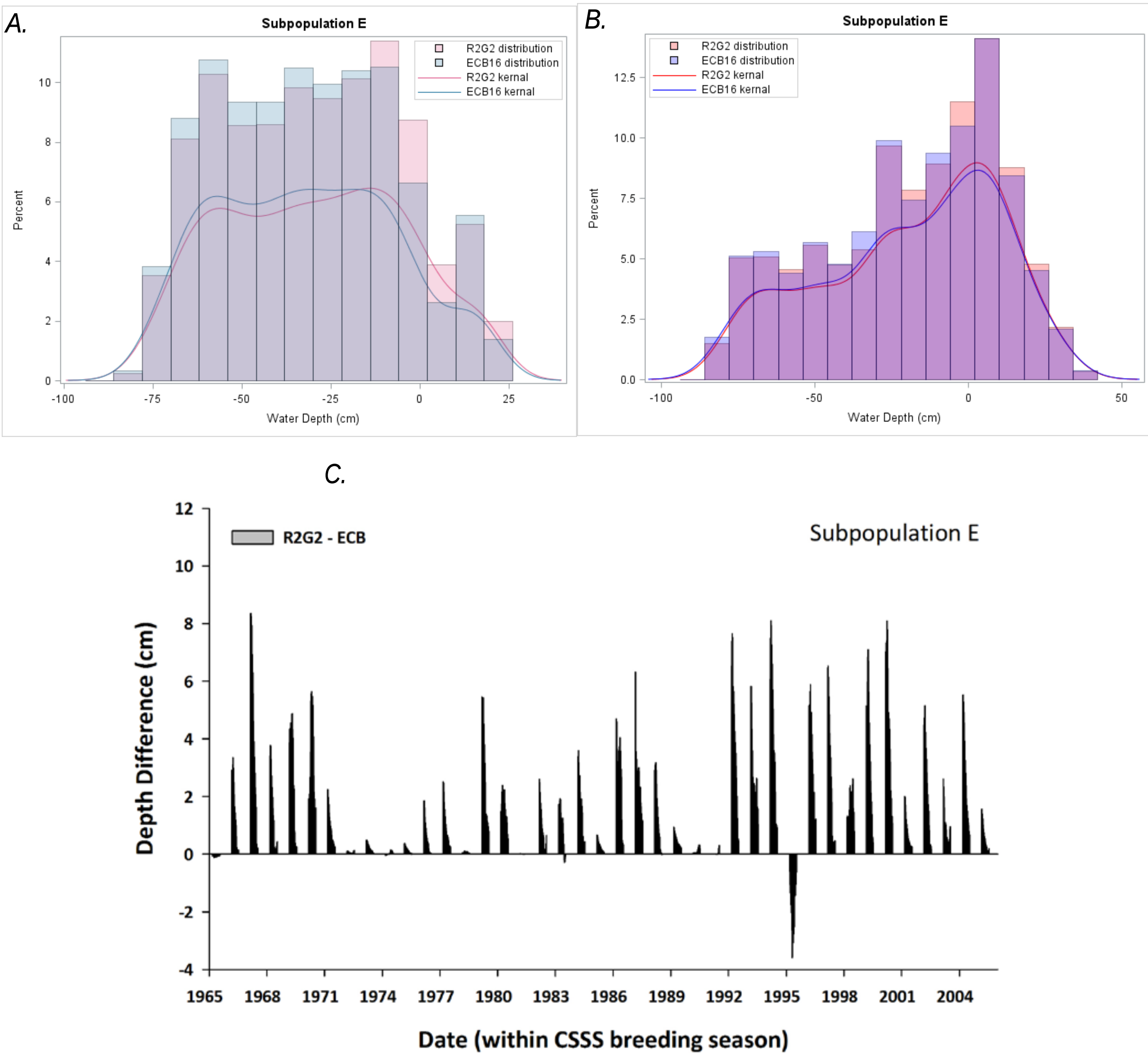


Figure 19. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2G2 scenario and baseline condition (ECB), in subpopulation E. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

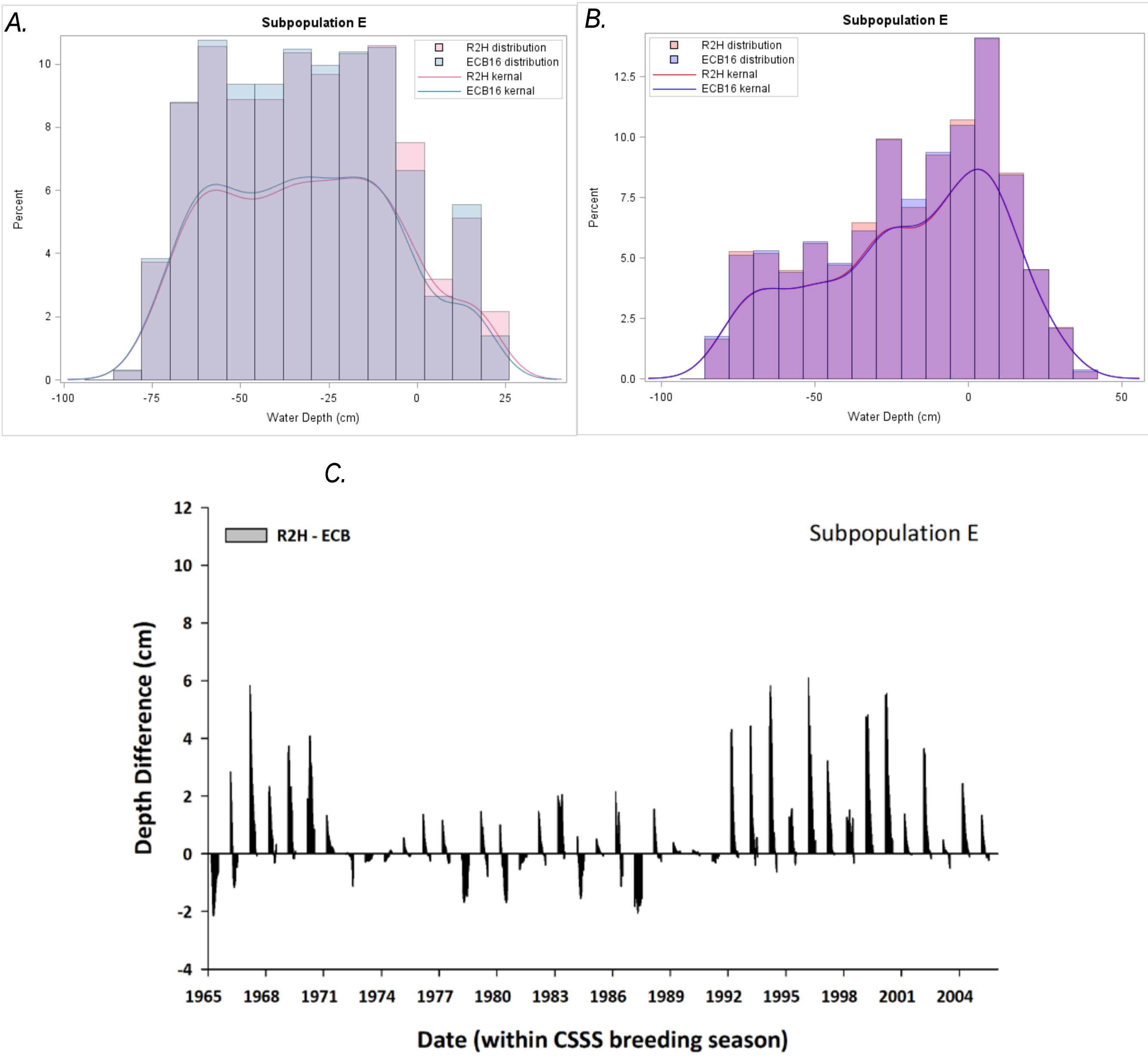


Figure 20. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2H scenario and baseline condition (ECB), in subpopulation E. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

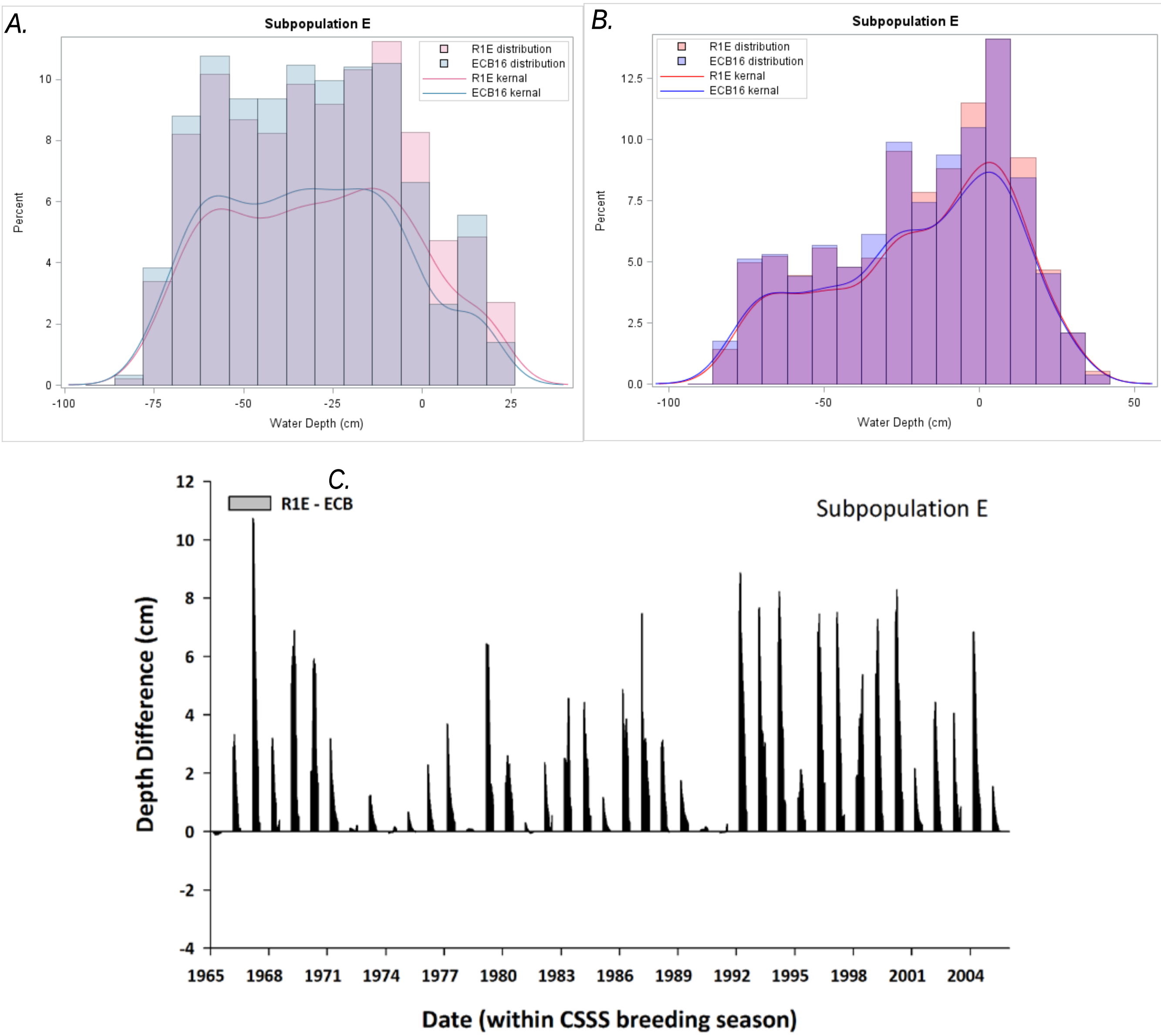
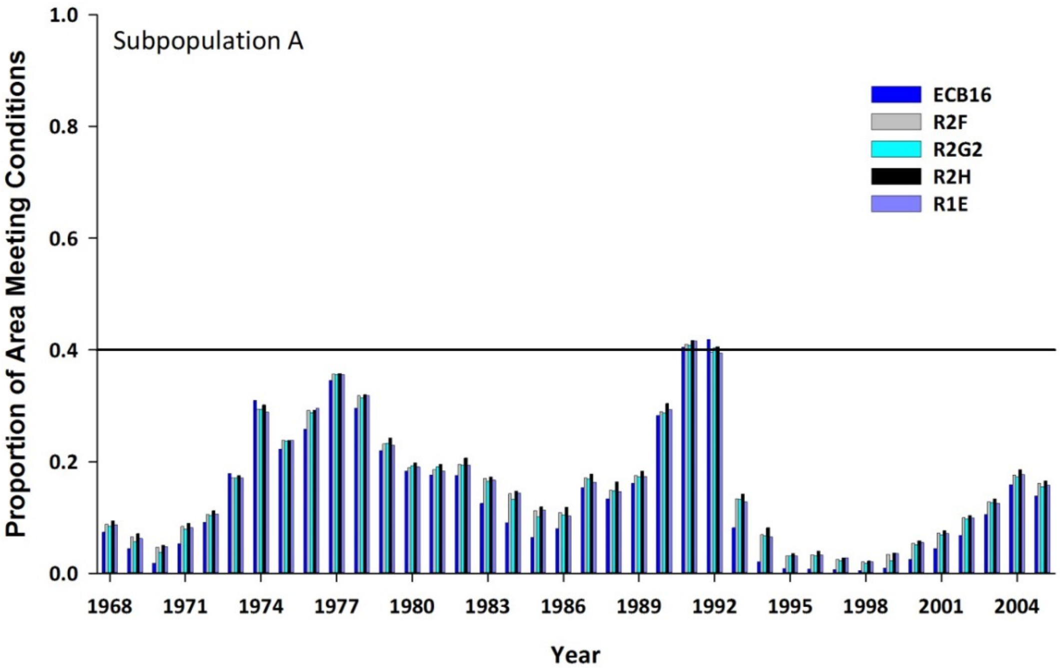


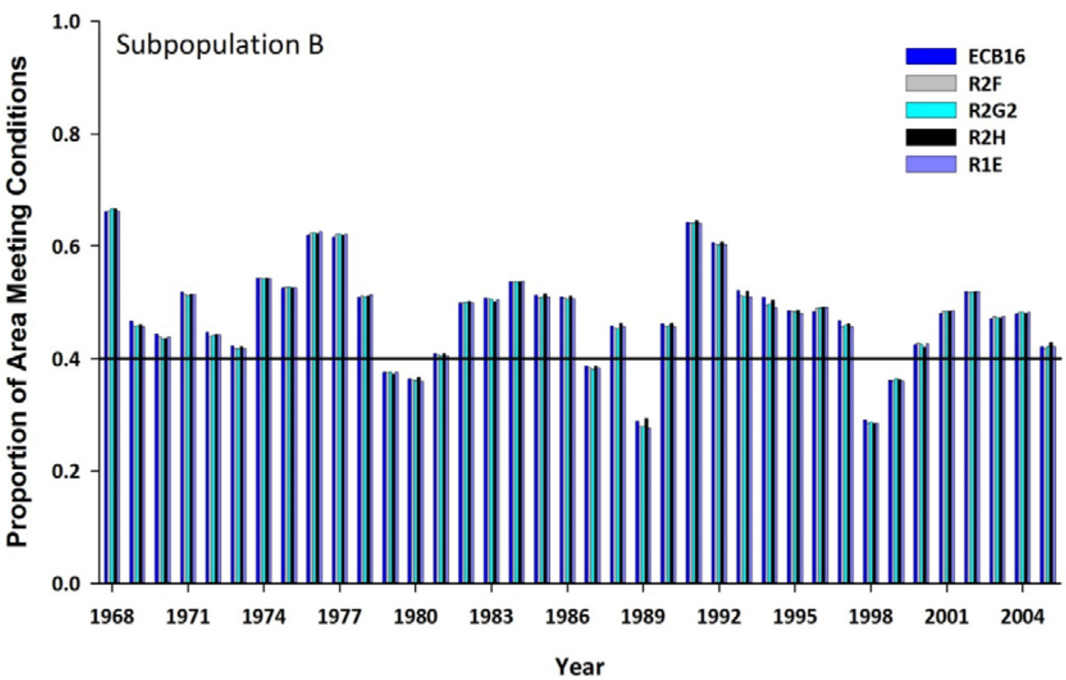
Figure 21. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R1E scenario and baseline condition (ECB), in subpopulation E. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

A.



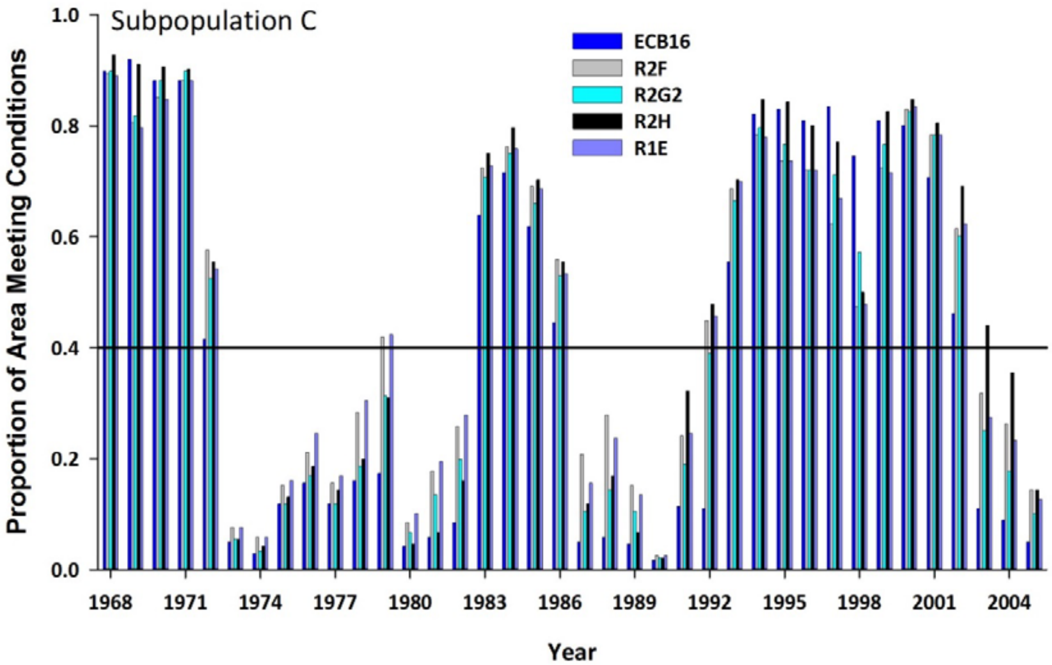
Subpopulation A
Proportion of Area Meeting Conditions
1.0
0.8
0.6
0.4
0.2
0.0
ECB16
R2F
R2G2
R2H
R1E
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
Year

B.

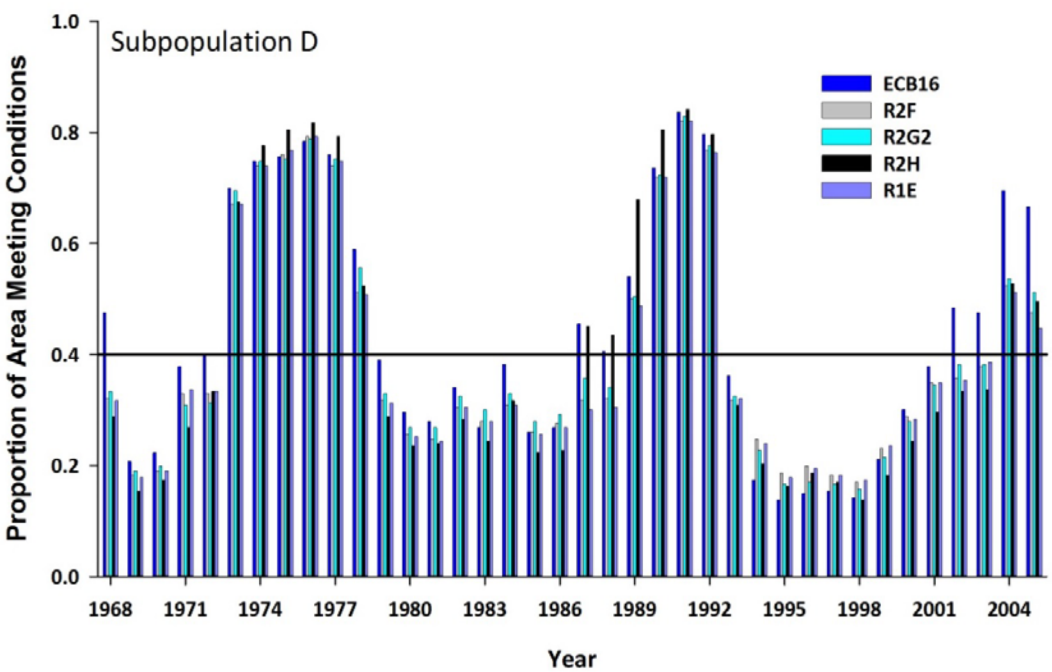


Subpopulation B
Proportion of Area Meeting Conditions
1.0
0.8
0.6
0.4
0.2
0.0
ECB16
R2F
R2G2
R2H
R1E
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
Year

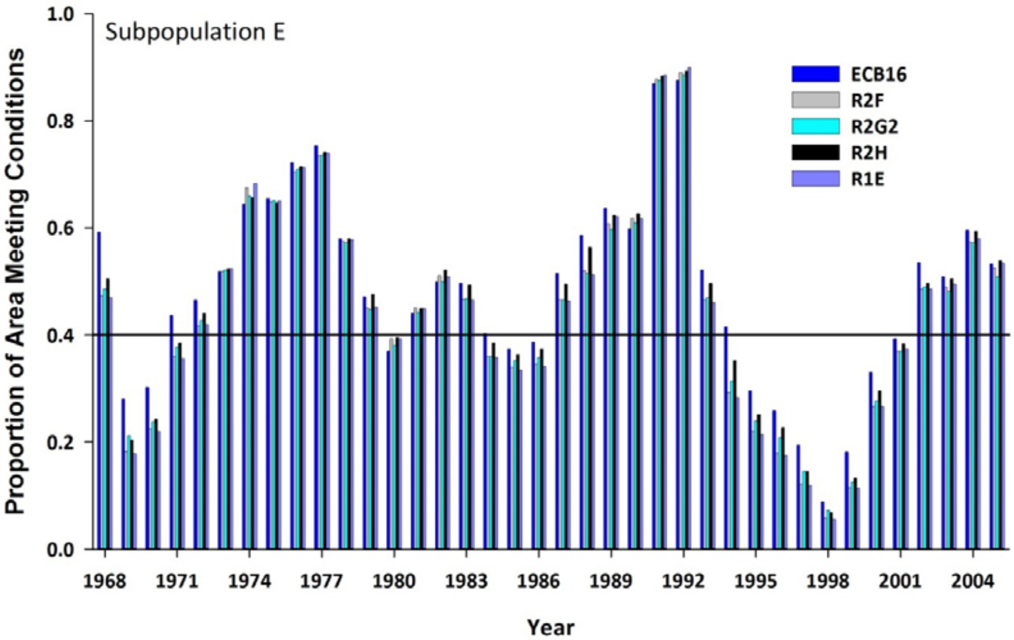
C.


Subpopulation C
ECB16
R2F
R2G2
R2H
R1E
Proportion of Area Meeting Conditions
Year
0.0
0.2
0.4
0.6
0.8
1.0
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004

D.


Subpopulation D
ECB16
R2F
R2G2
R2H
R1E
Proportion of Area Meeting Conditions
Year
0.0
0.2
0.4
0.6
0.8
1.0
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004

E.



F.

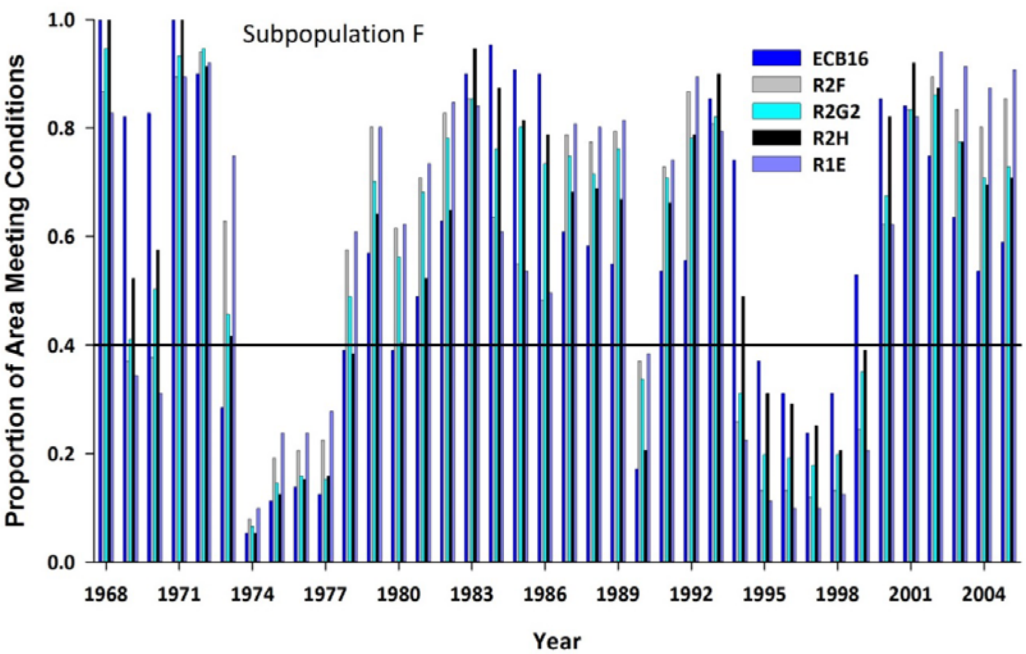
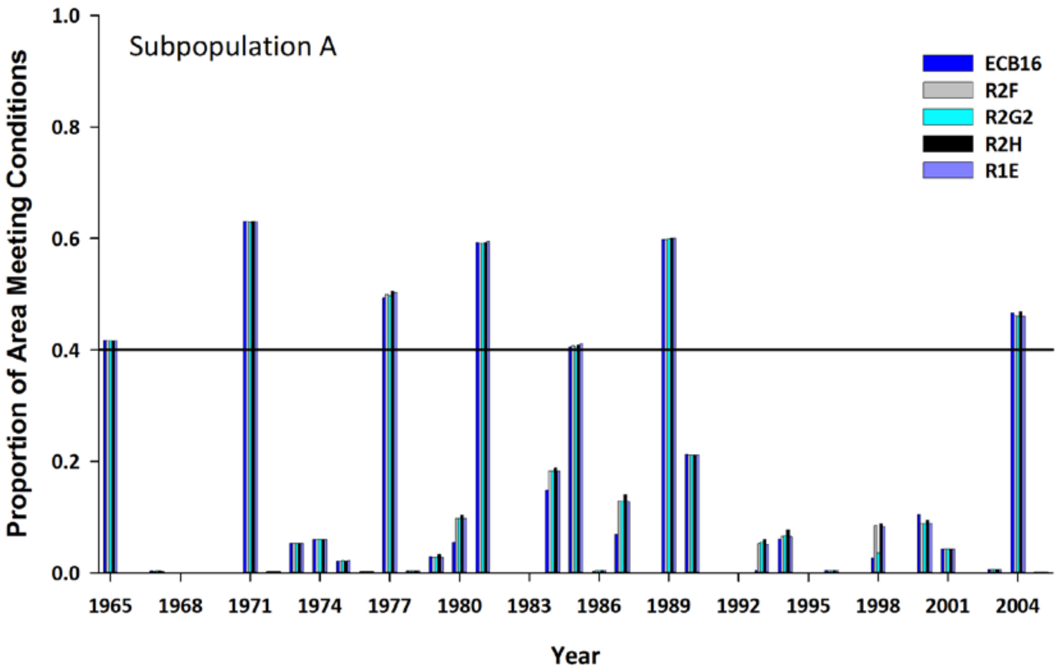
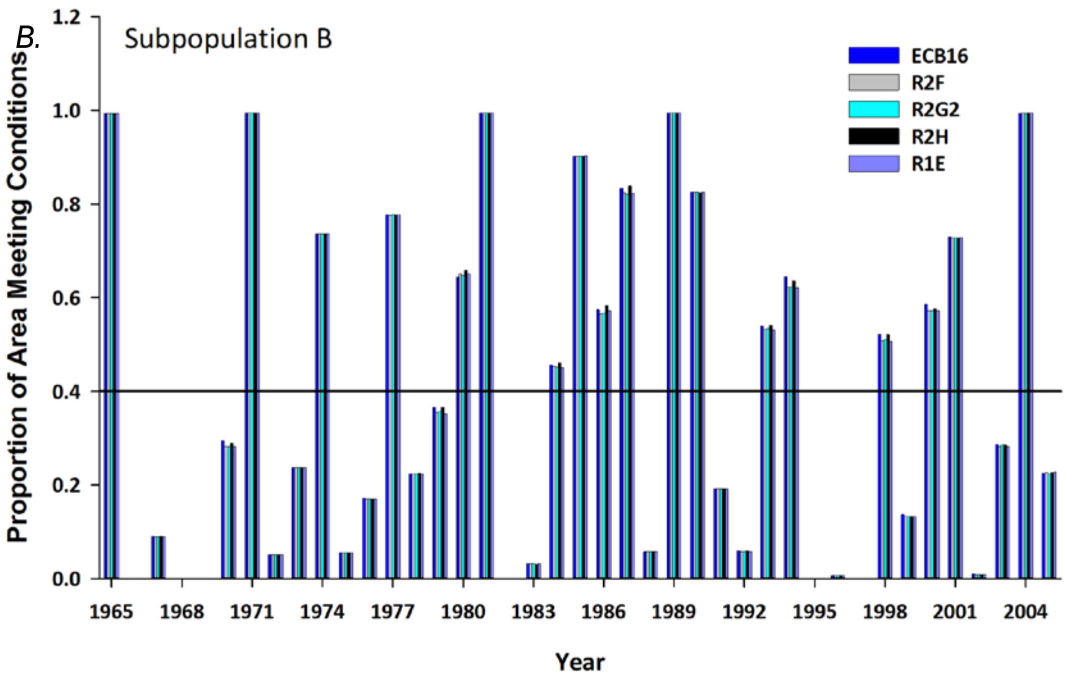


Figure 22. Graphs showing proportion of total area of subpopulation A (*A.*), B (*B.*), C (*C.*), D (*D.*), E (*E.*), and F (*F.*) meeting U.S. Fish and Wildlife Service target 4-year hydroperiod of 90–210 days for 4 scenarios (R2F, R2G2, R2H, R1E) and the baseline condition (ECB; 1968–2005).

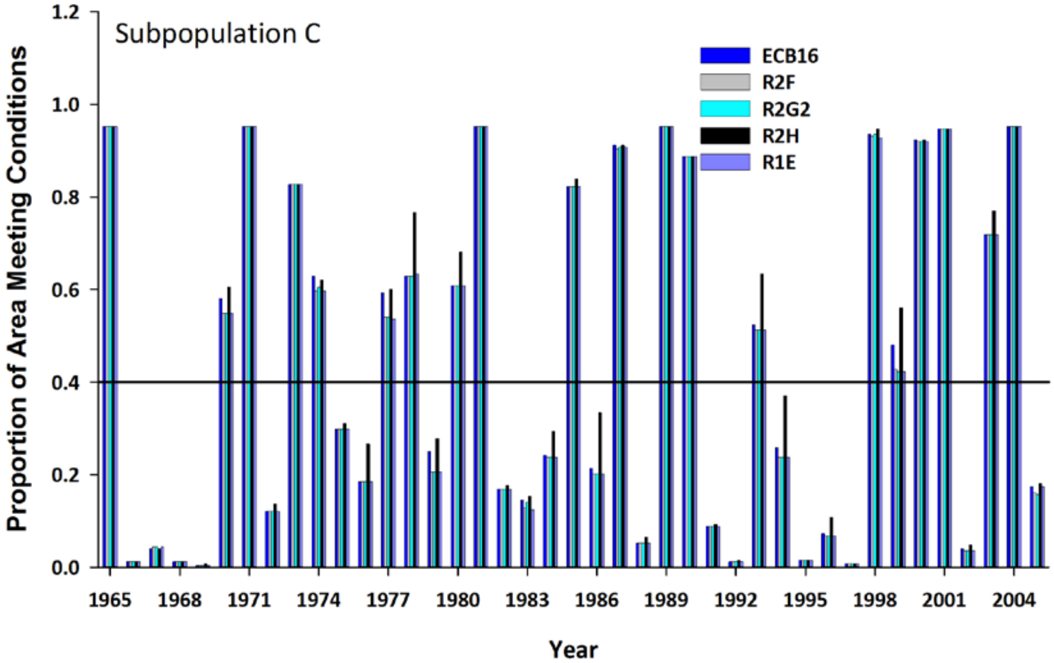
A.


Subpopulation A
ECB16
R2F
R2G2
R2H
R1E
Proportion of Area Meeting Conditions
Year
1.0
0.8
0.6
0.4
0.2
0.0
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004

B.

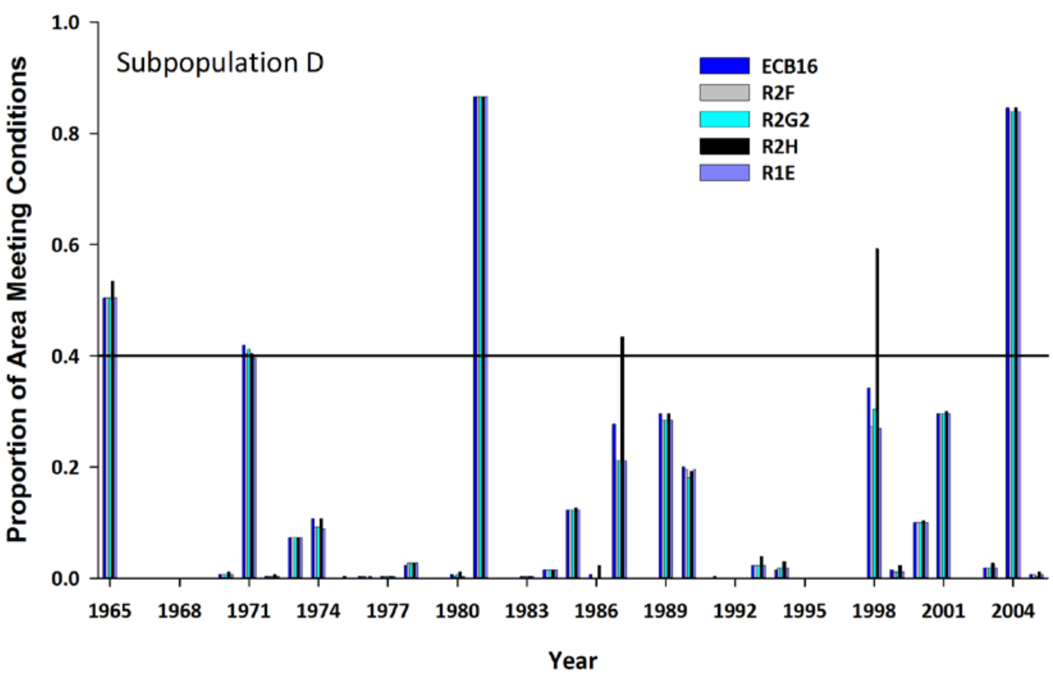

Subpopulation B
ECB16
R2F
R2G2
R2H
R1E
Proportion of Area Meeting Conditions
Year
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004

C.



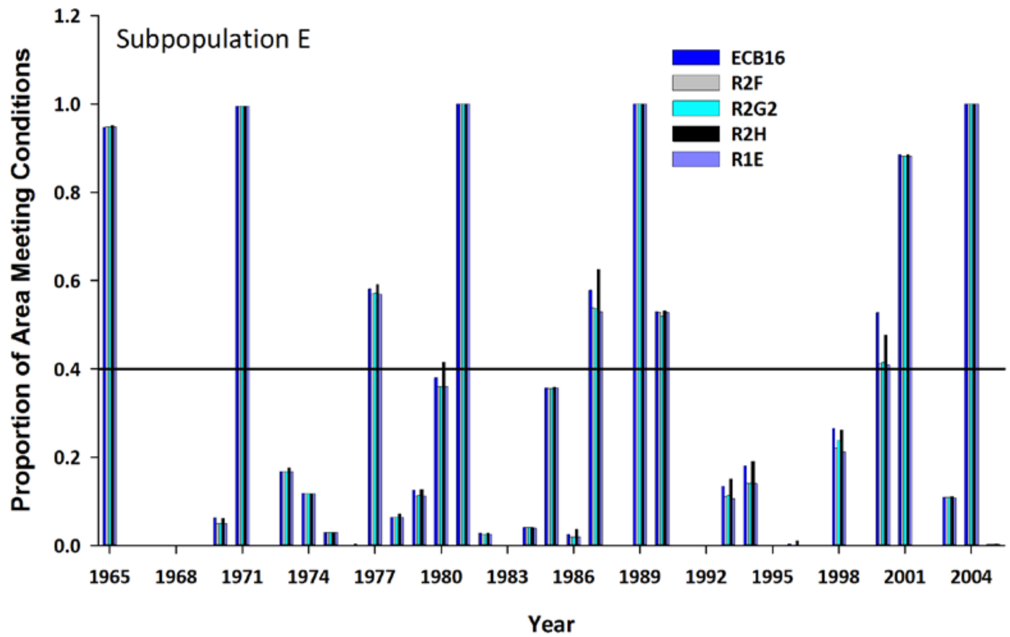
Subpopulation C
ECB16
R2F
R2G2
R2H
R1E
Proportion of Area Meeting Conditions
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
Year

D.



Subpopulation D
ECB16
R2F
R2G2
R2H
R1E
Proportion of Area Meeting Conditions
1.0
0.8
0.6
0.4
0.2
0.0
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
Year

E.



F.

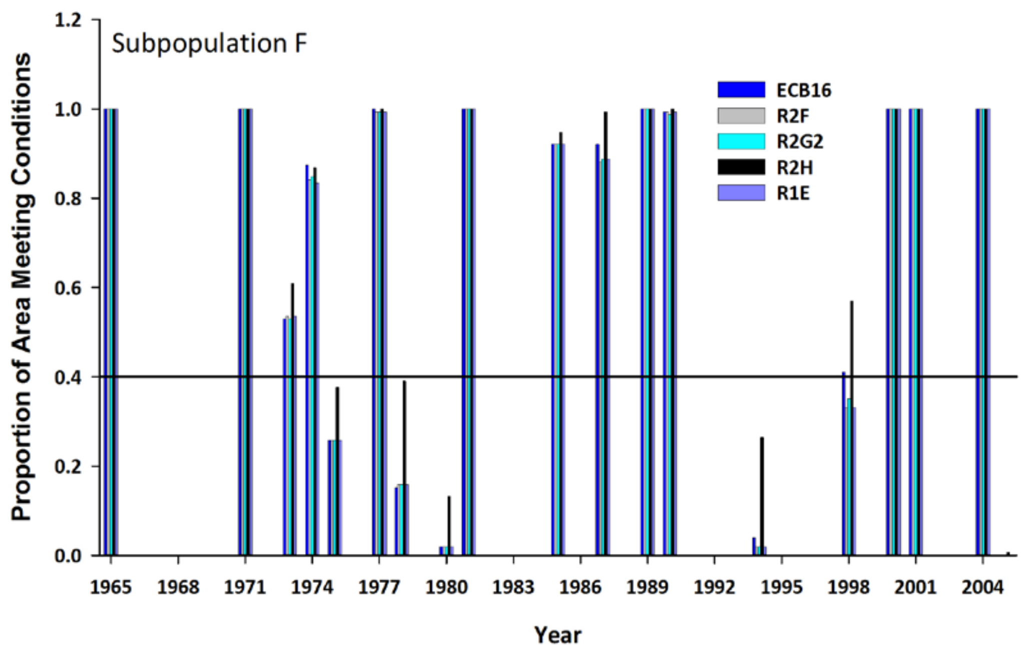


Figure 23. Graphs showing proportion of total area of subpopulation A (*A.*), B (*B.*), C (*C.*), D (*D.*), E (*E.*), and F (*F.*) meeting U.S. Fish and Wildlife Service target of > 90 consecutive dry days within the breeding season (Mar 1–Jul 15; 1965 –2005) for 4 scenarios (R2F, R2G2, R2H, R1E) and the baseline condition (ECB).

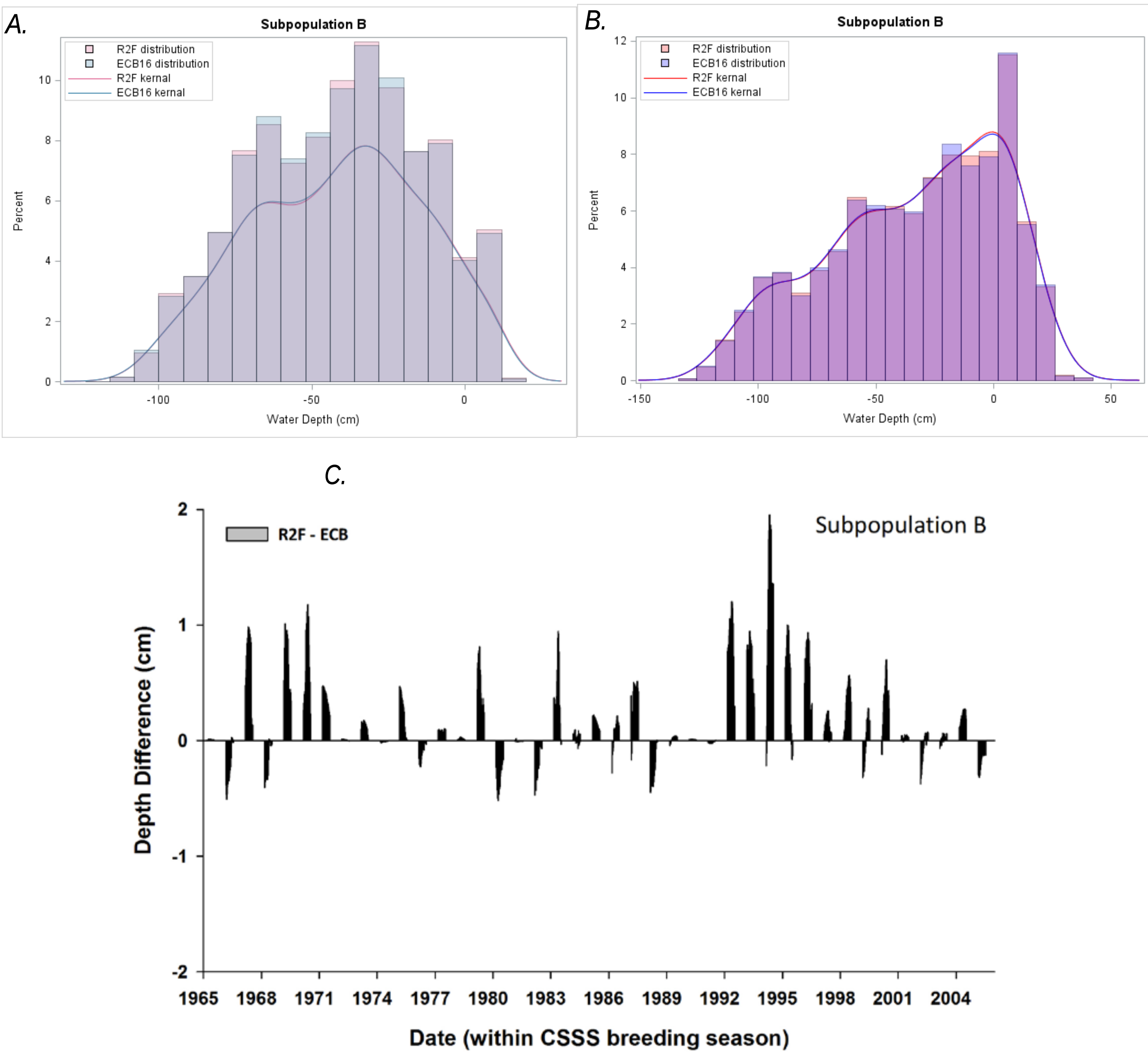


Figure 24. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2F scenario and baseline condition (ECB), in subpopulation B. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

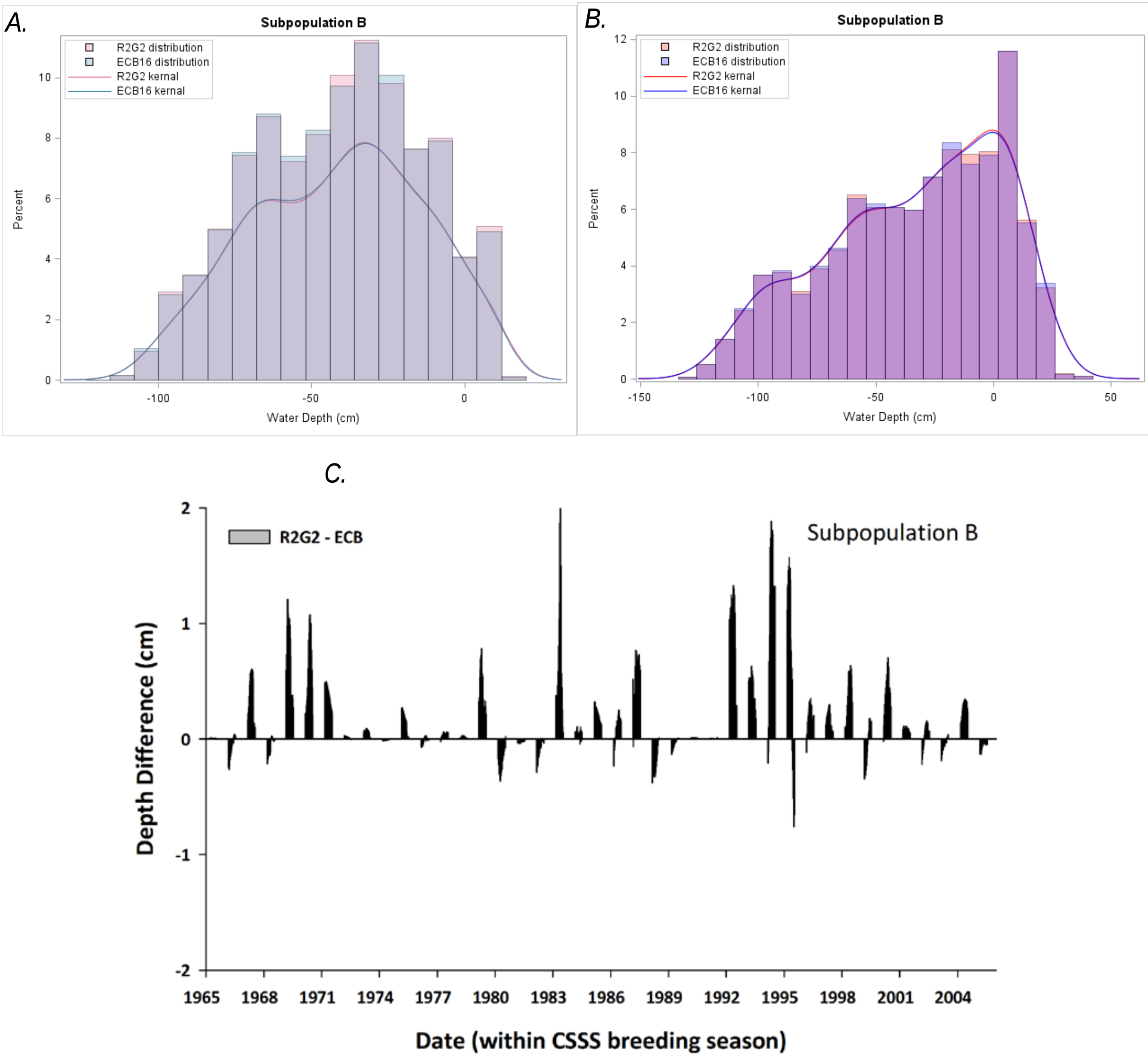


Figure 25. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2G2 scenario and baseline condition (ECB), in subpopulation B. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

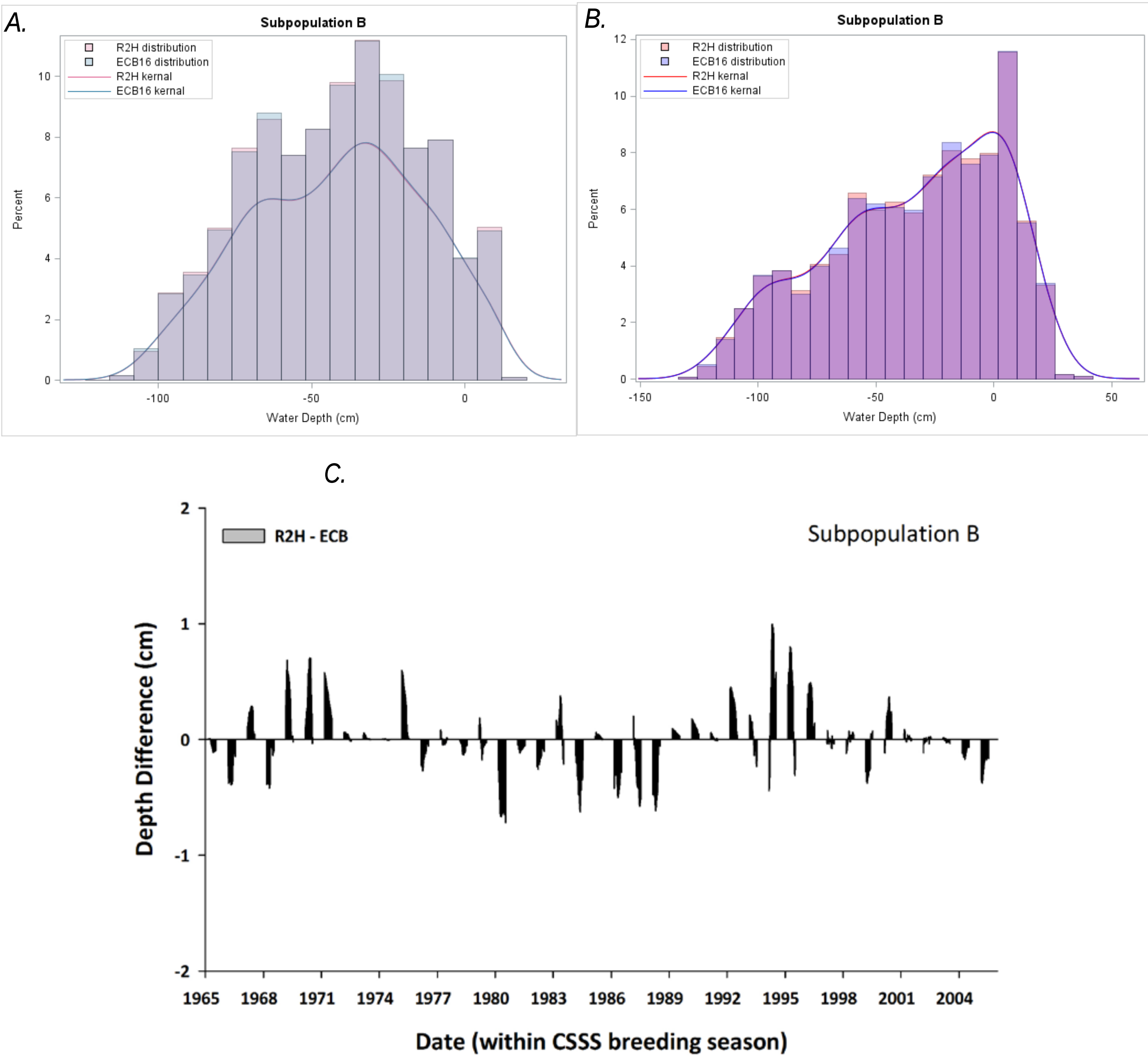


Figure 26. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2H scenario and baseline condition (ECB), in subpopulation B. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

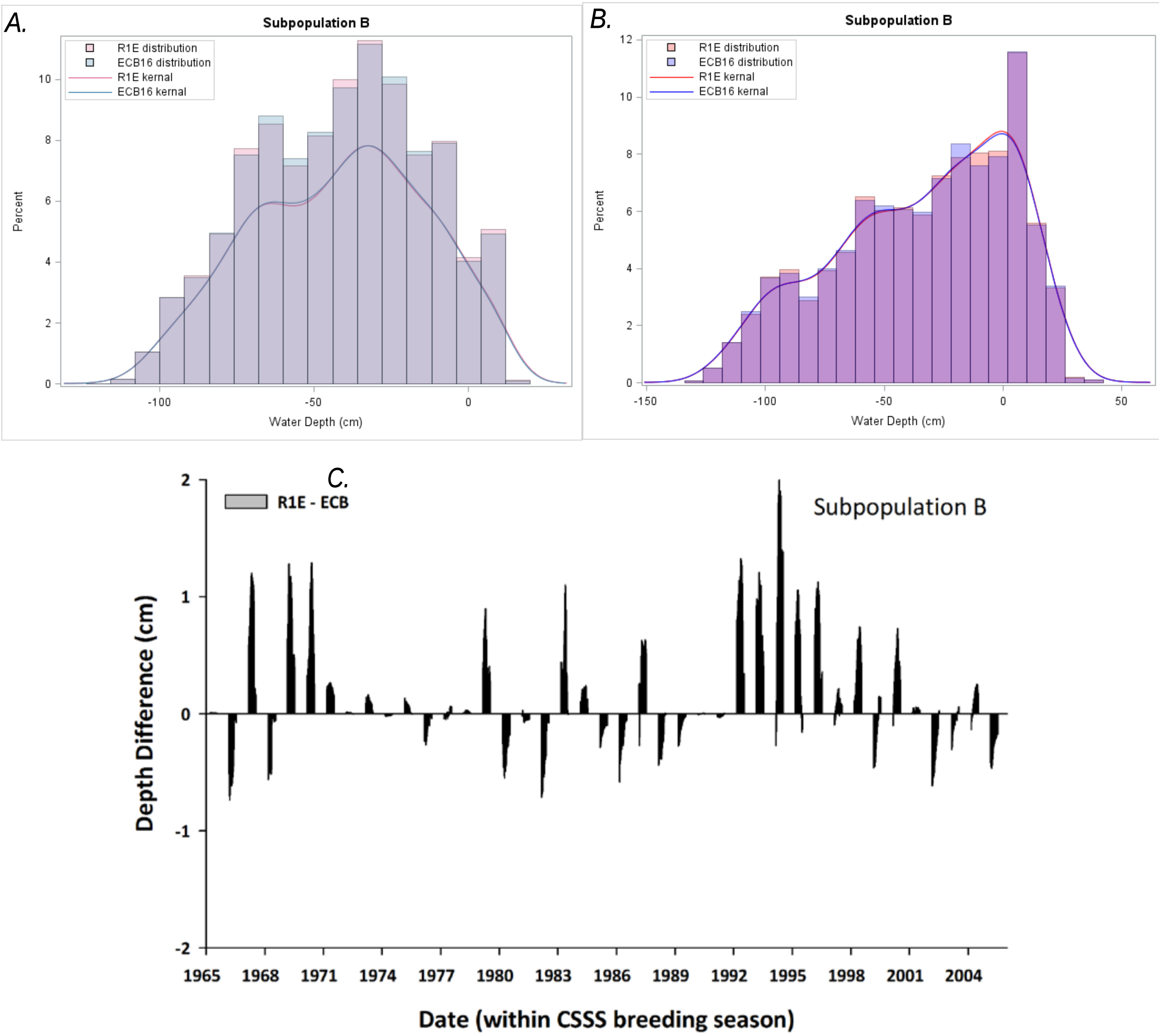


Figure 27. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R1E scenario and baseline condition (ECB), in subpopulation B. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

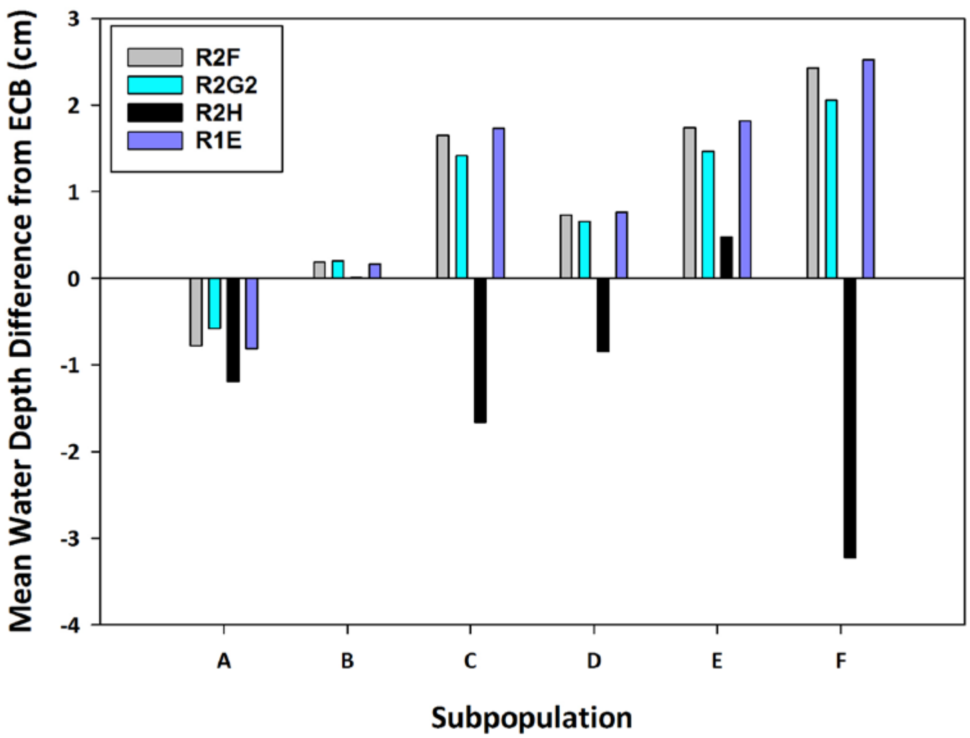


Figure 28. Graph showing mean water depth difference (centimeters; cm) relative to the existing conditions baseline (ECB) across all breeding seasons (Mar–July 15, 1965–2005) for each scenario within each subpopulation.

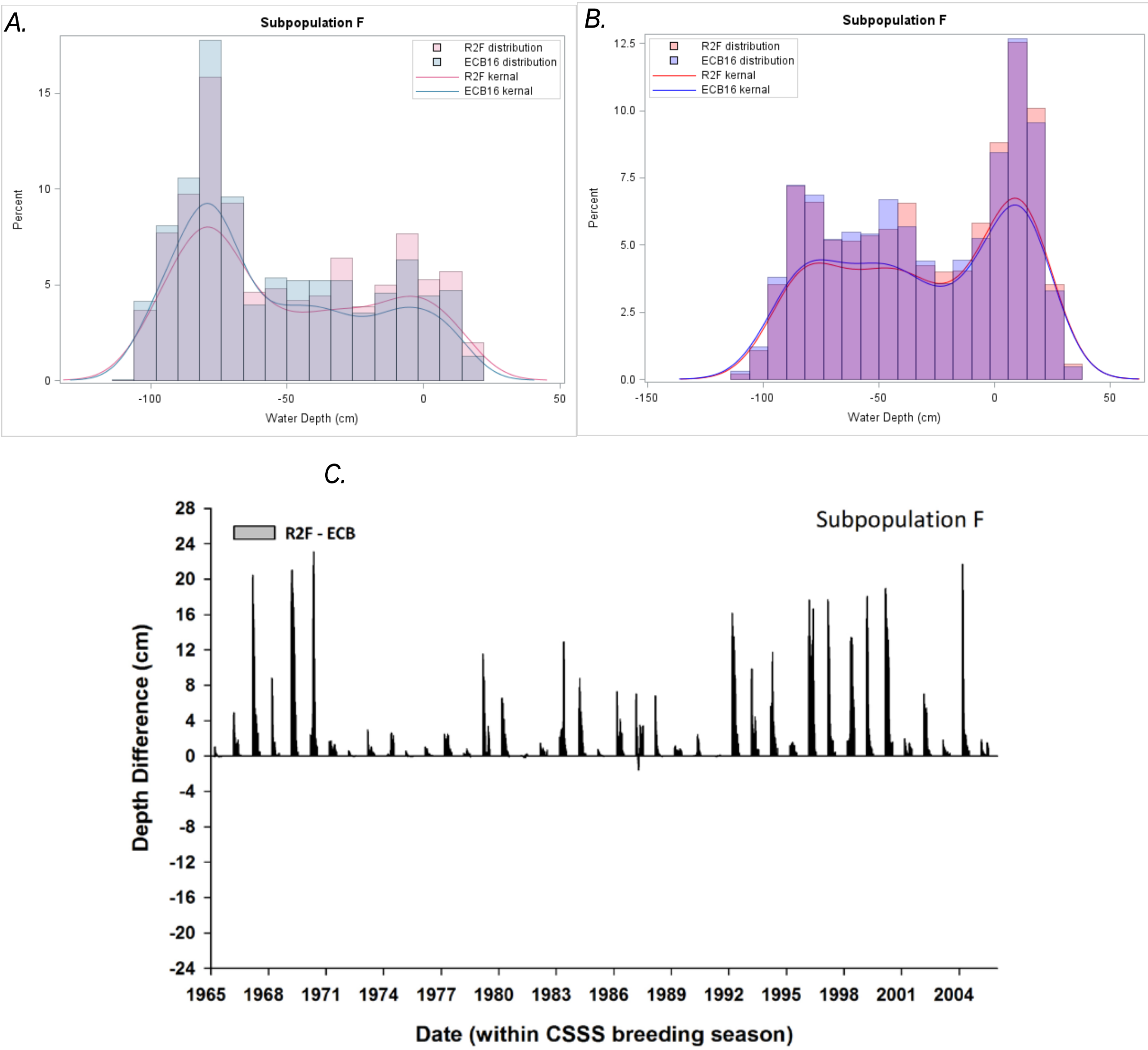


Figure 29. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2F scenario and baseline condition (ECB), in subpopulation F. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

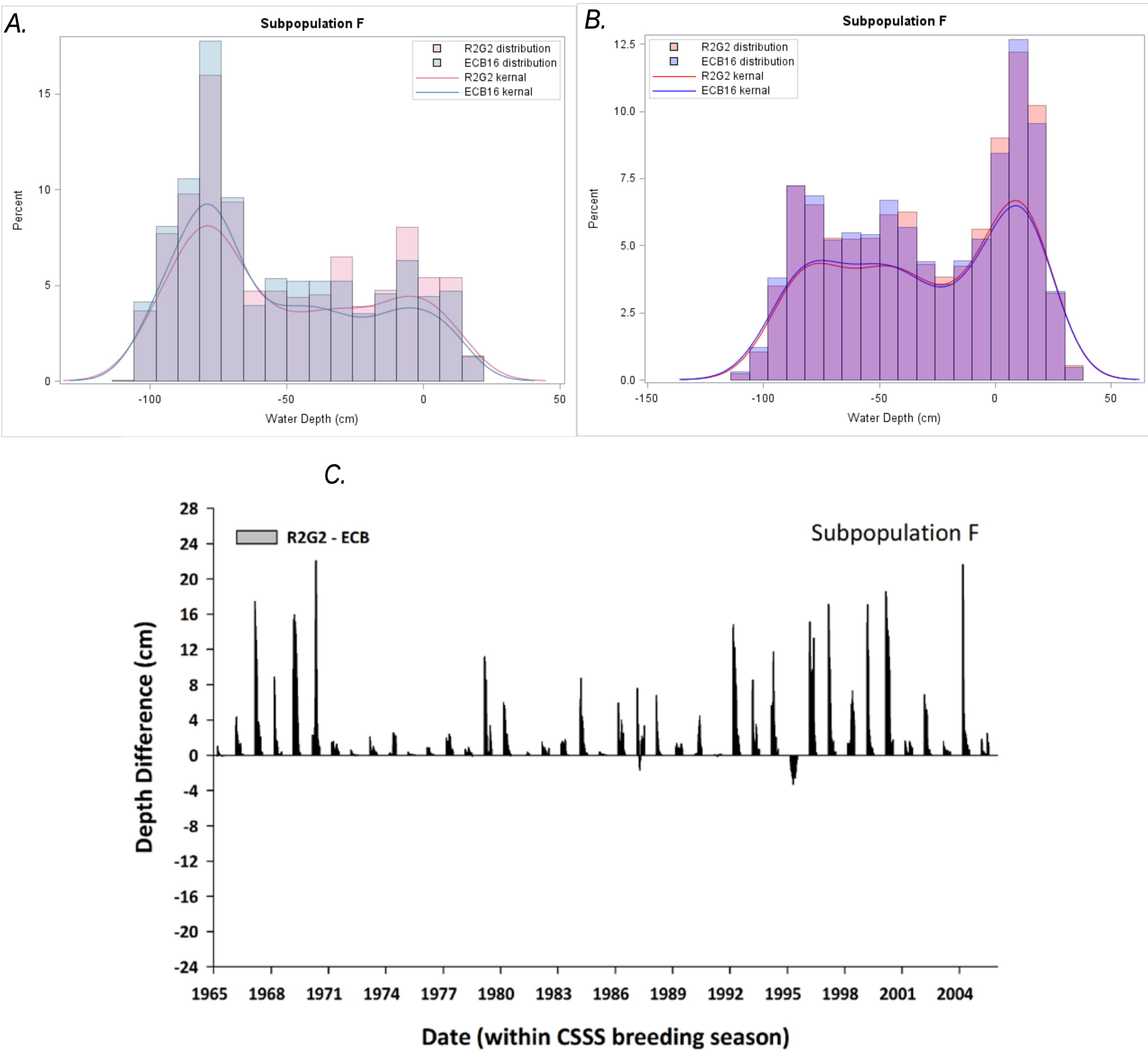


Figure 30. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2G2 scenario and baseline condition (ECB), in subpopulation F. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

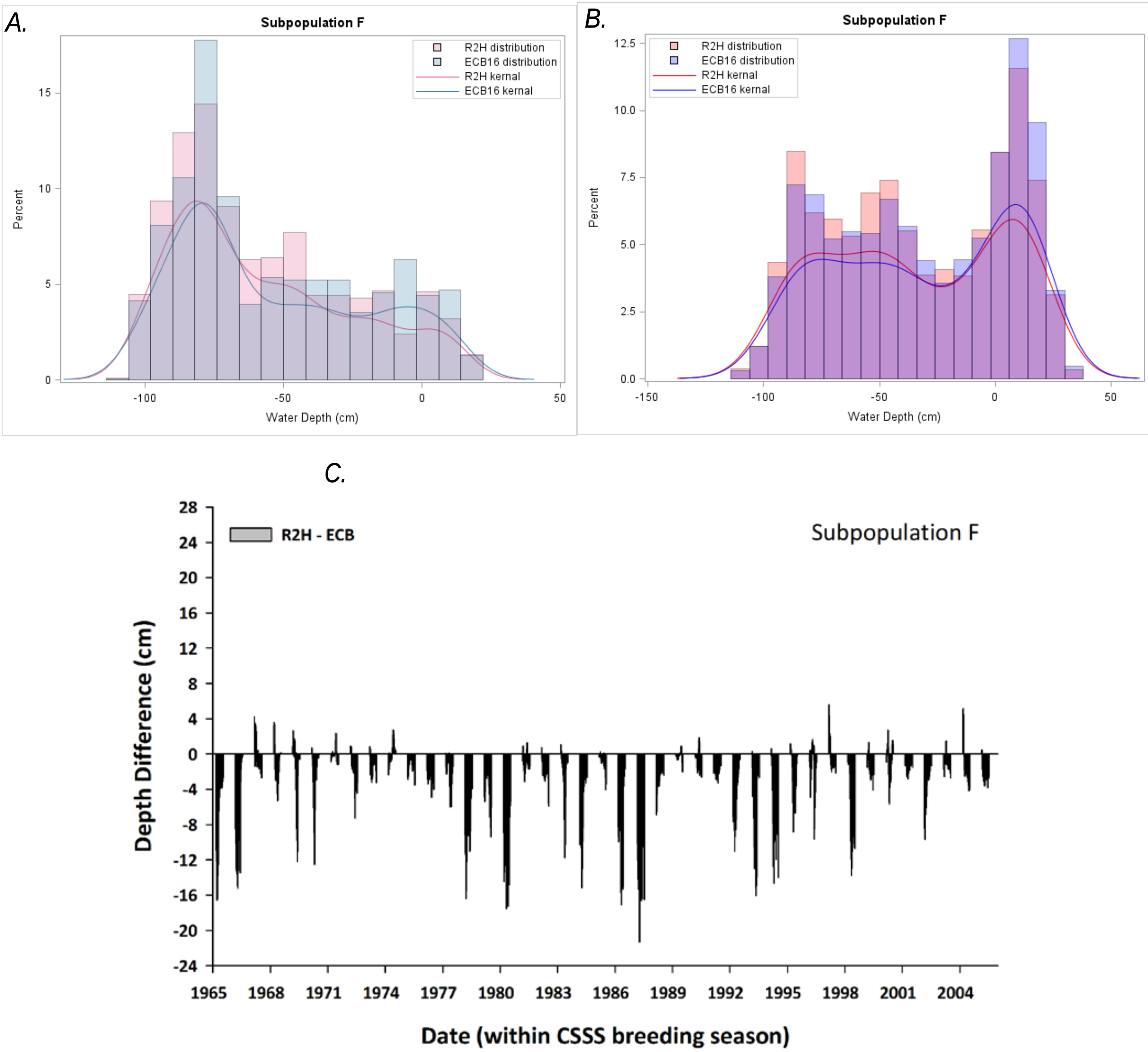


Figure 31. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2H scenario and baseline condition (ECB), in subpopulation F. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

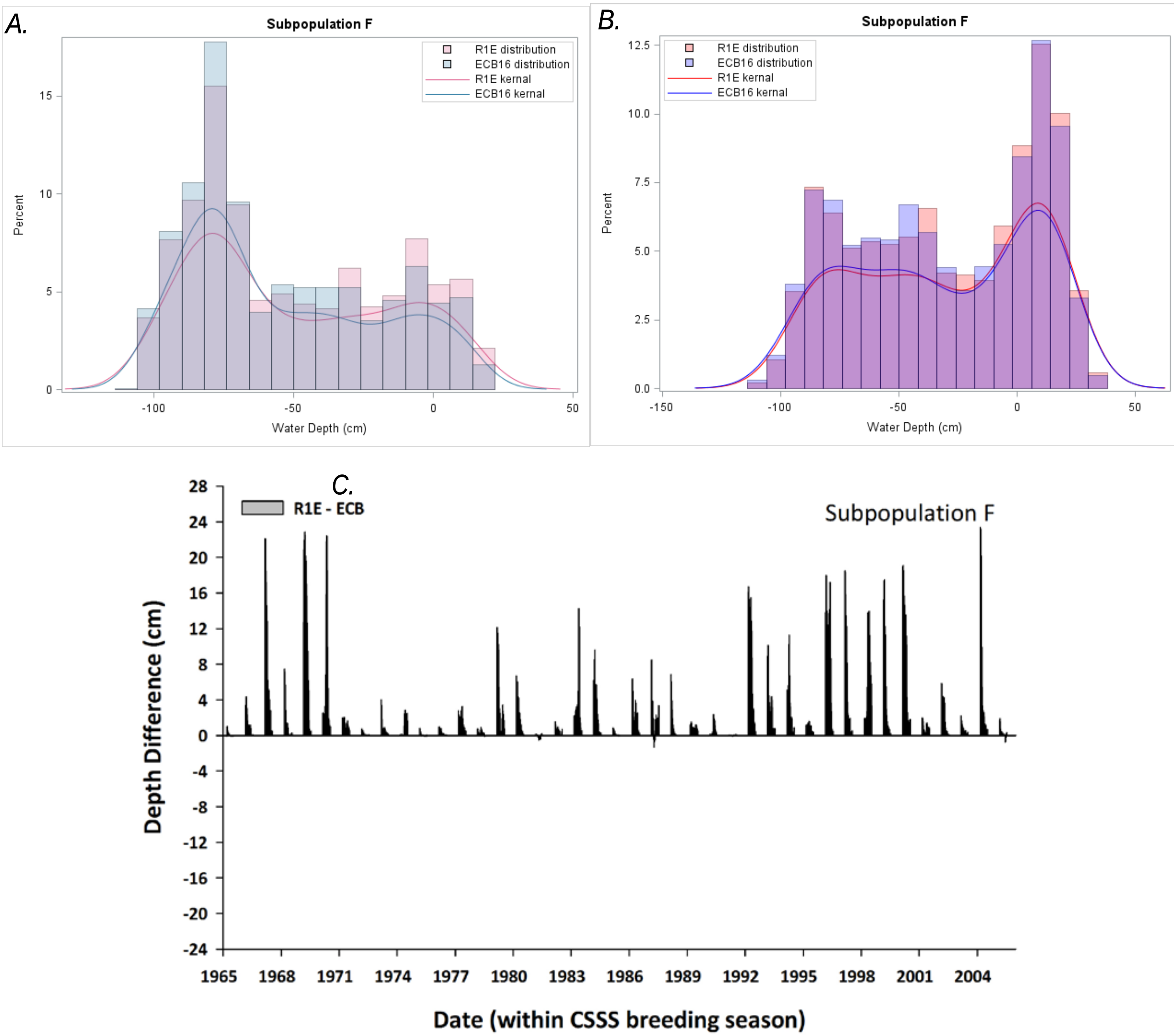


Figure 32. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R1E scenario and baseline condition (ECB), in subpopulation F. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

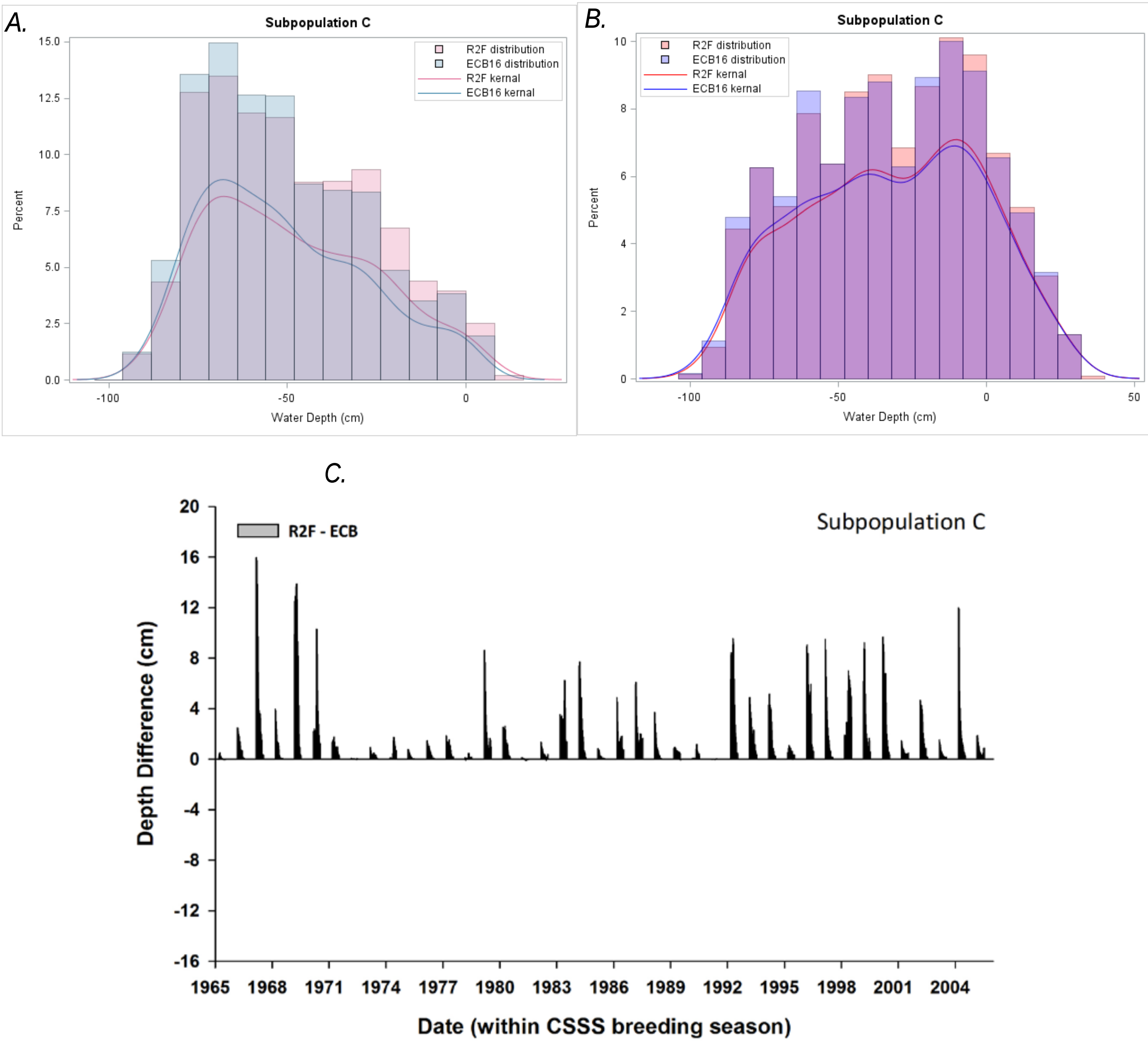


Figure 33. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2F scenario and baseline condition (ECB), in subpopulation C. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

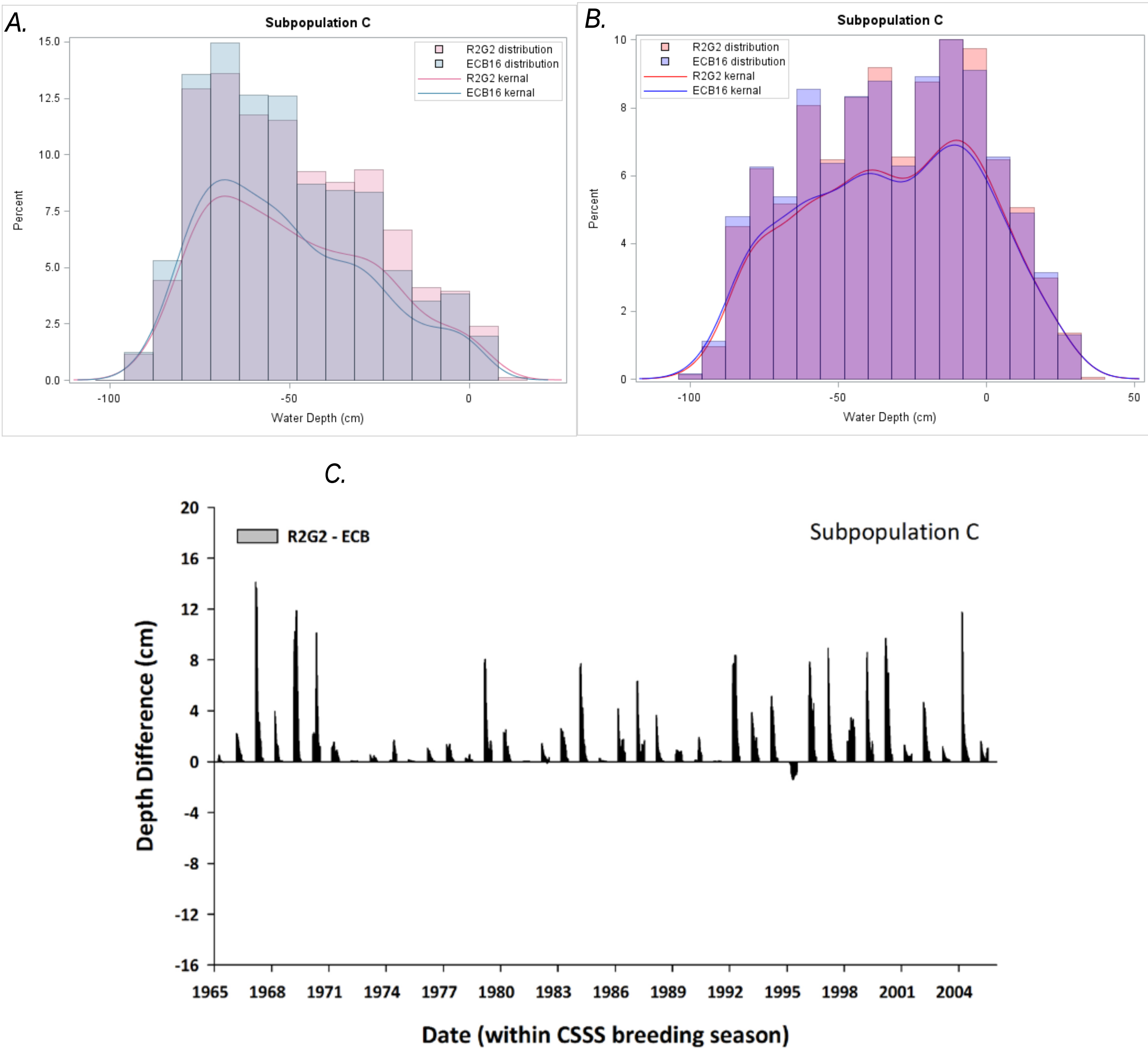


Figure 34. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2G2 scenario and baseline condition (ECB), in subpopulation C. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

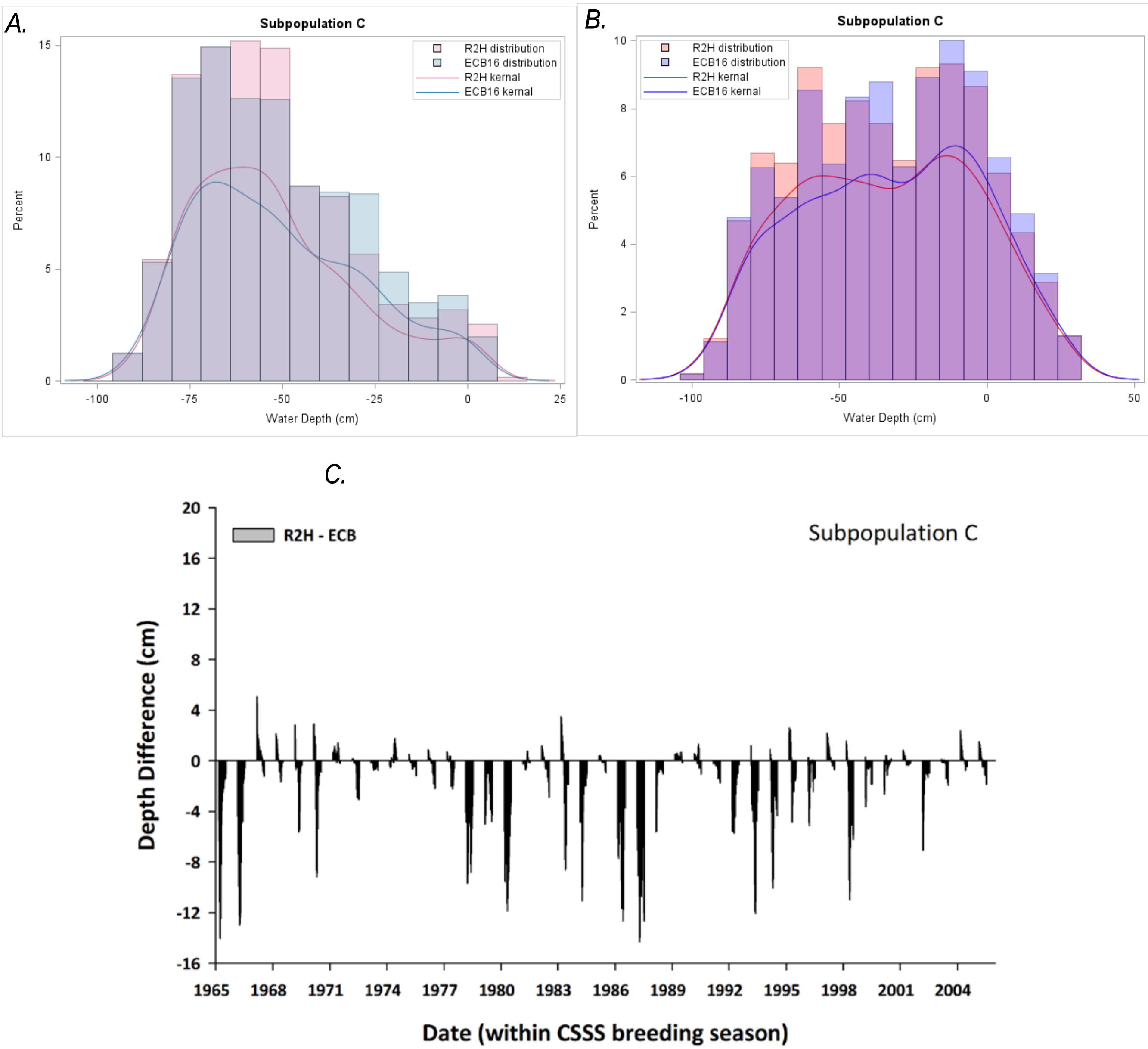


Figure 35. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2H scenario and baseline condition (ECB), in subpopulation C. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

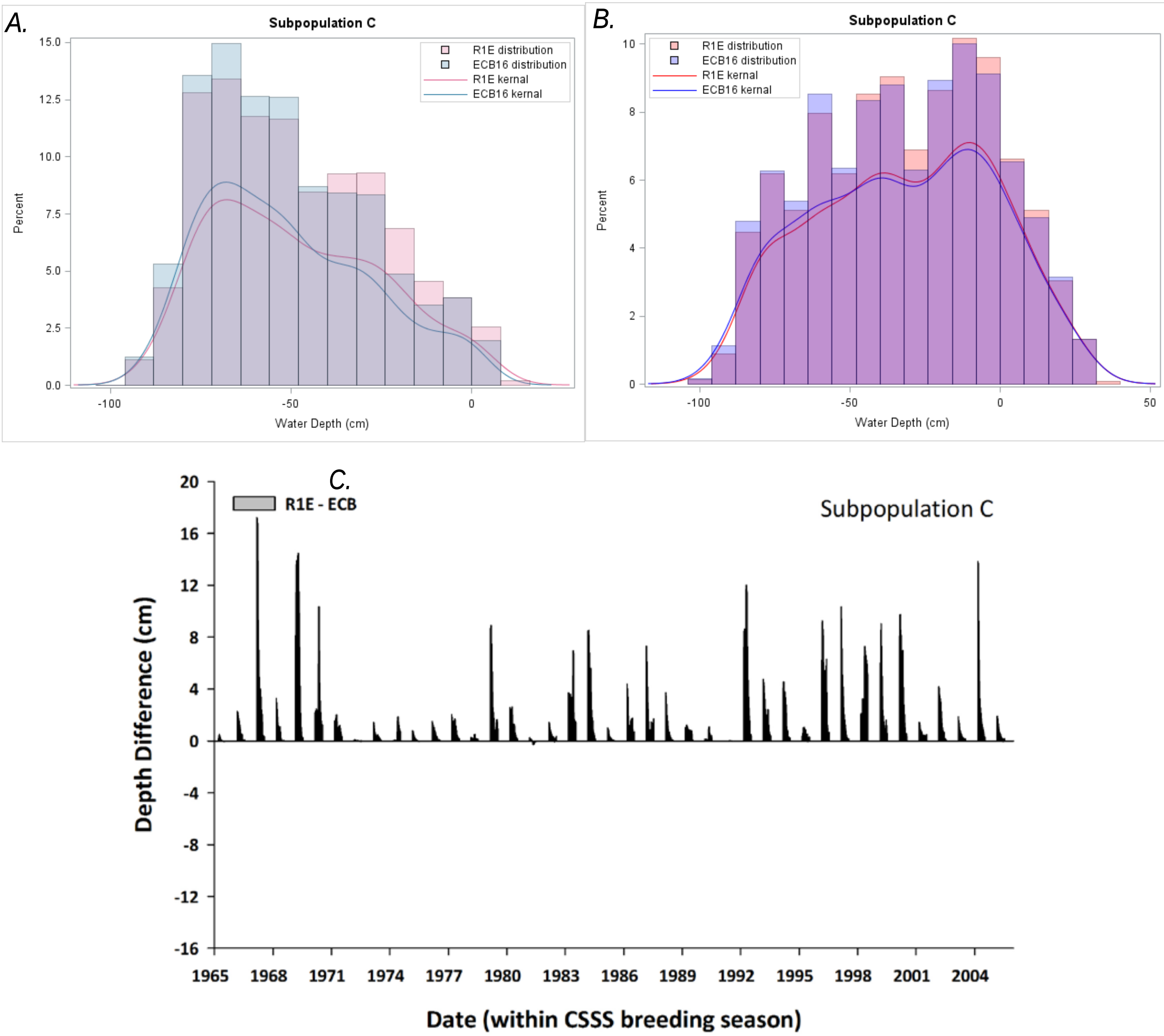


Figure 36. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R1E scenario and baseline condition (ECB), in subpopulation C. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

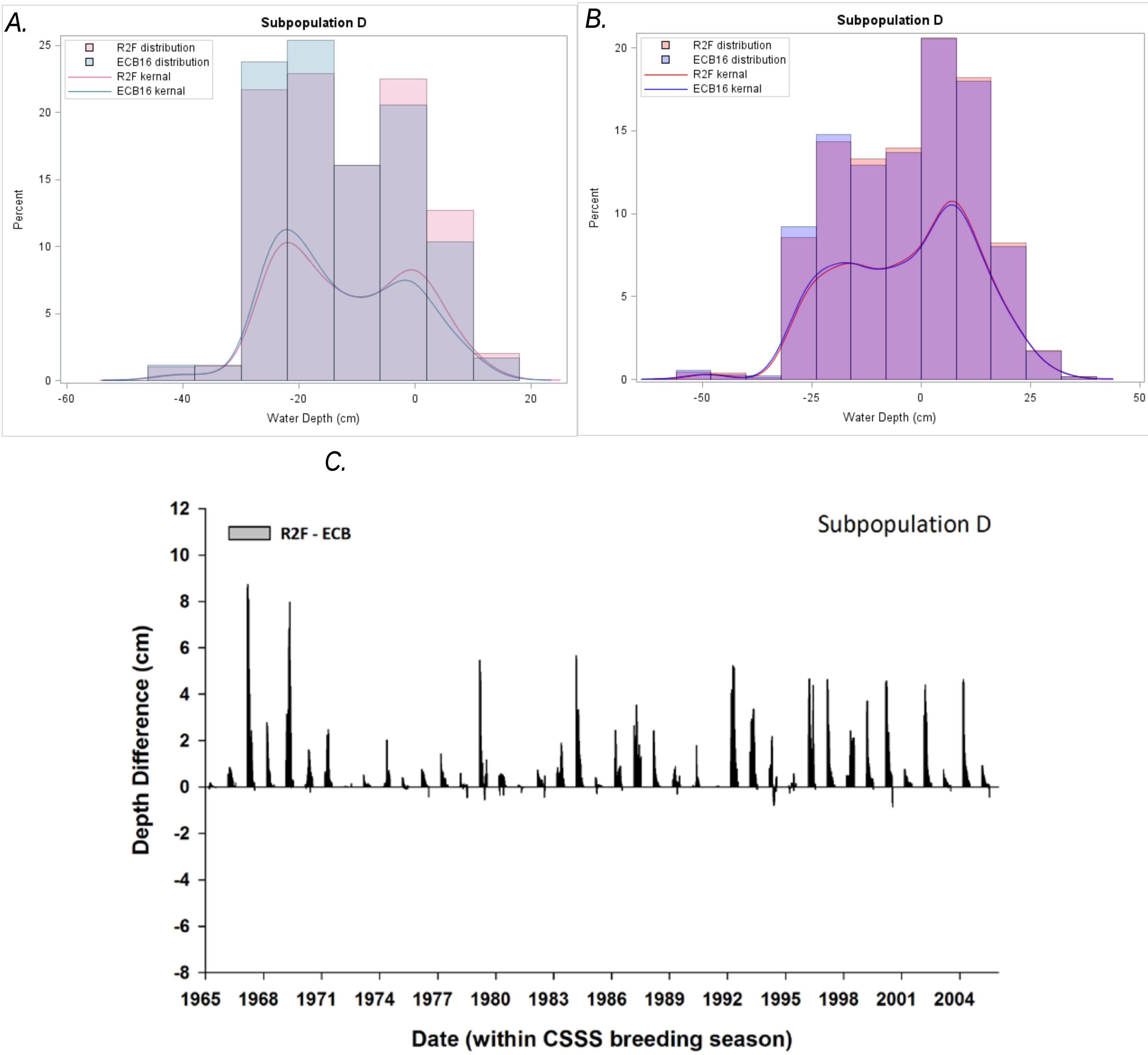


Figure 37. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2F scenario and baseline condition (ECB), in subpopulation D. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

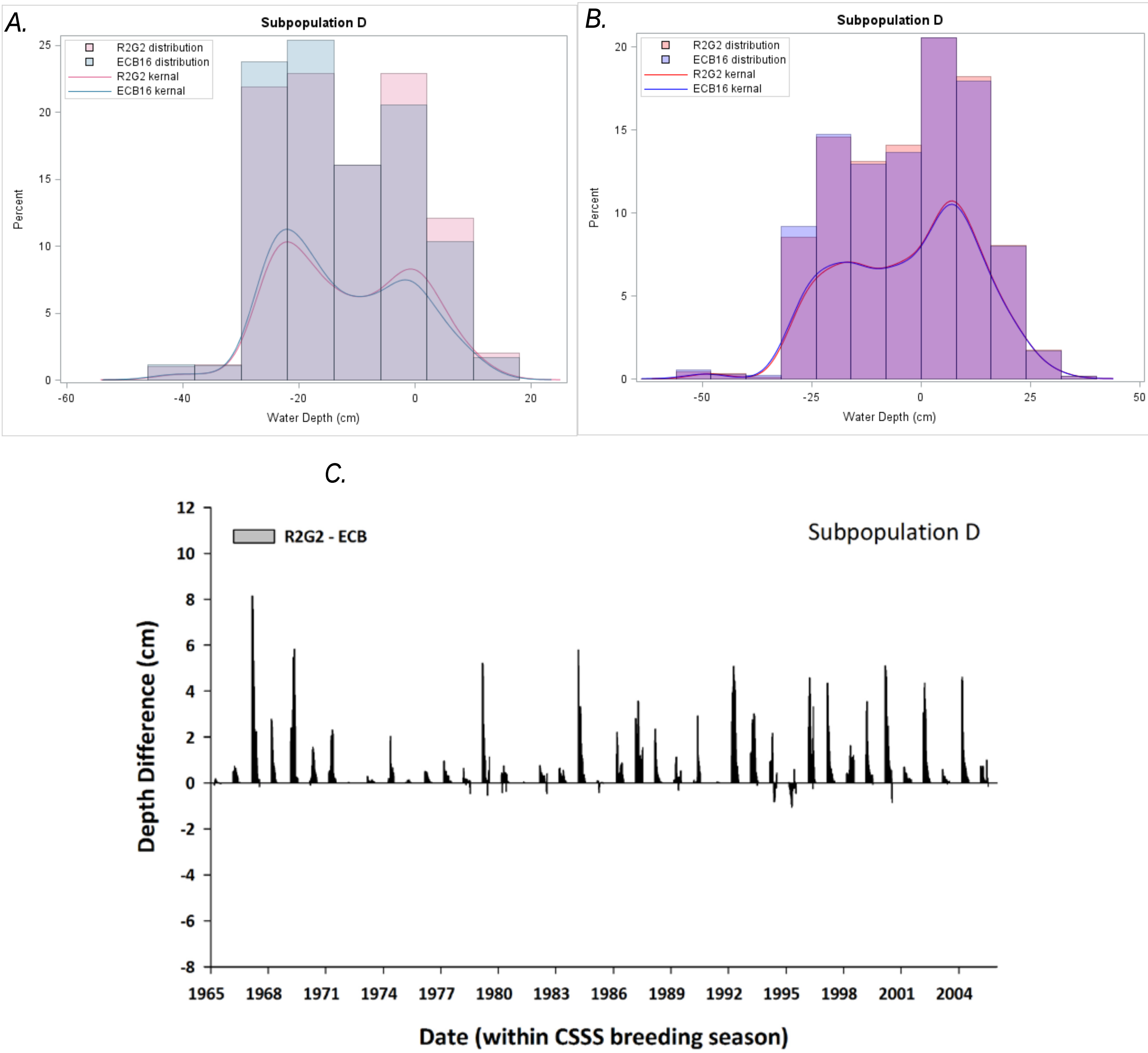


Figure 38. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2G2 scenario and baseline condition (ECB), in subpopulation D. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

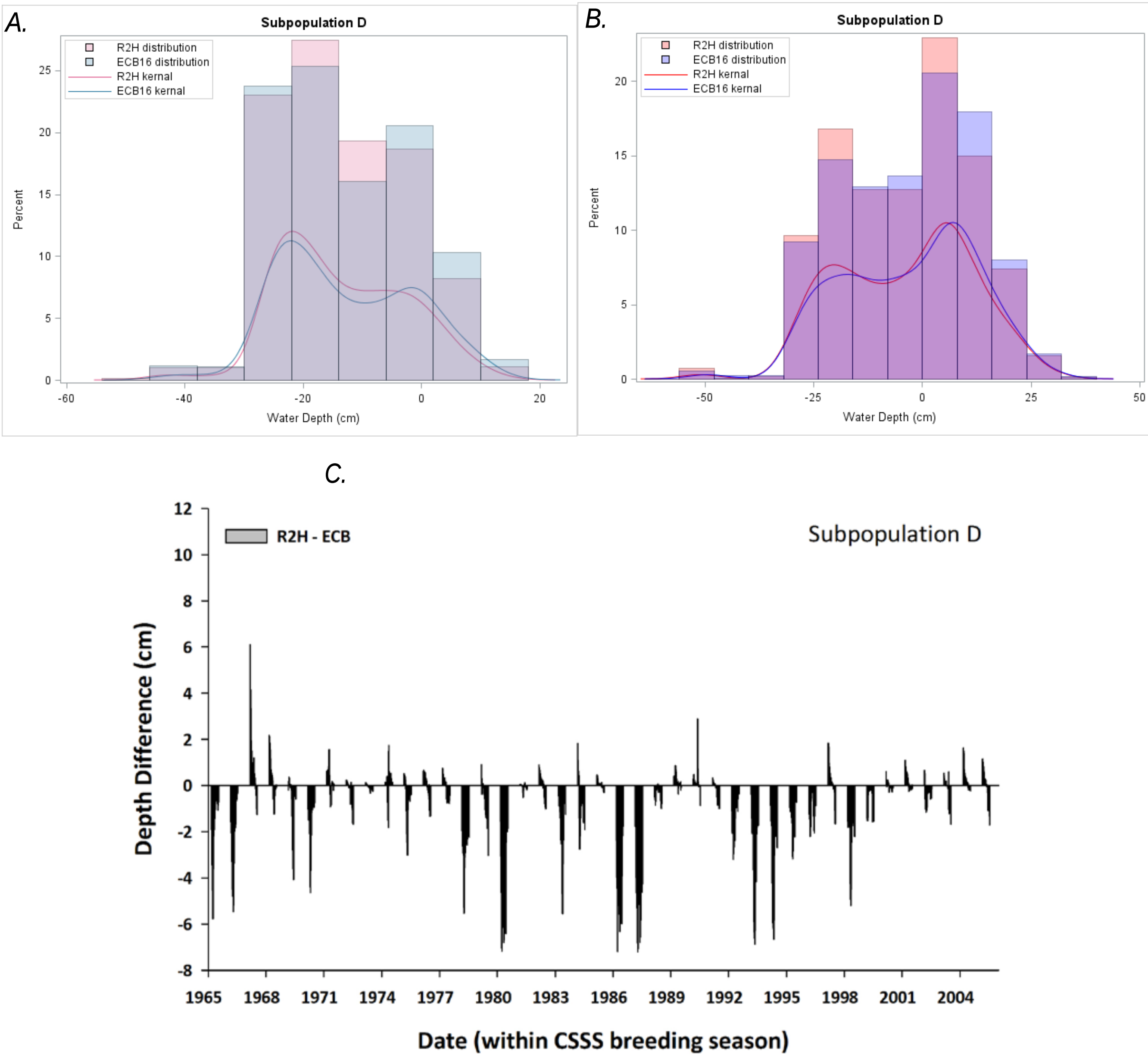


Figure 39. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R2H scenario and baseline condition (ECB), in subpopulation D. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

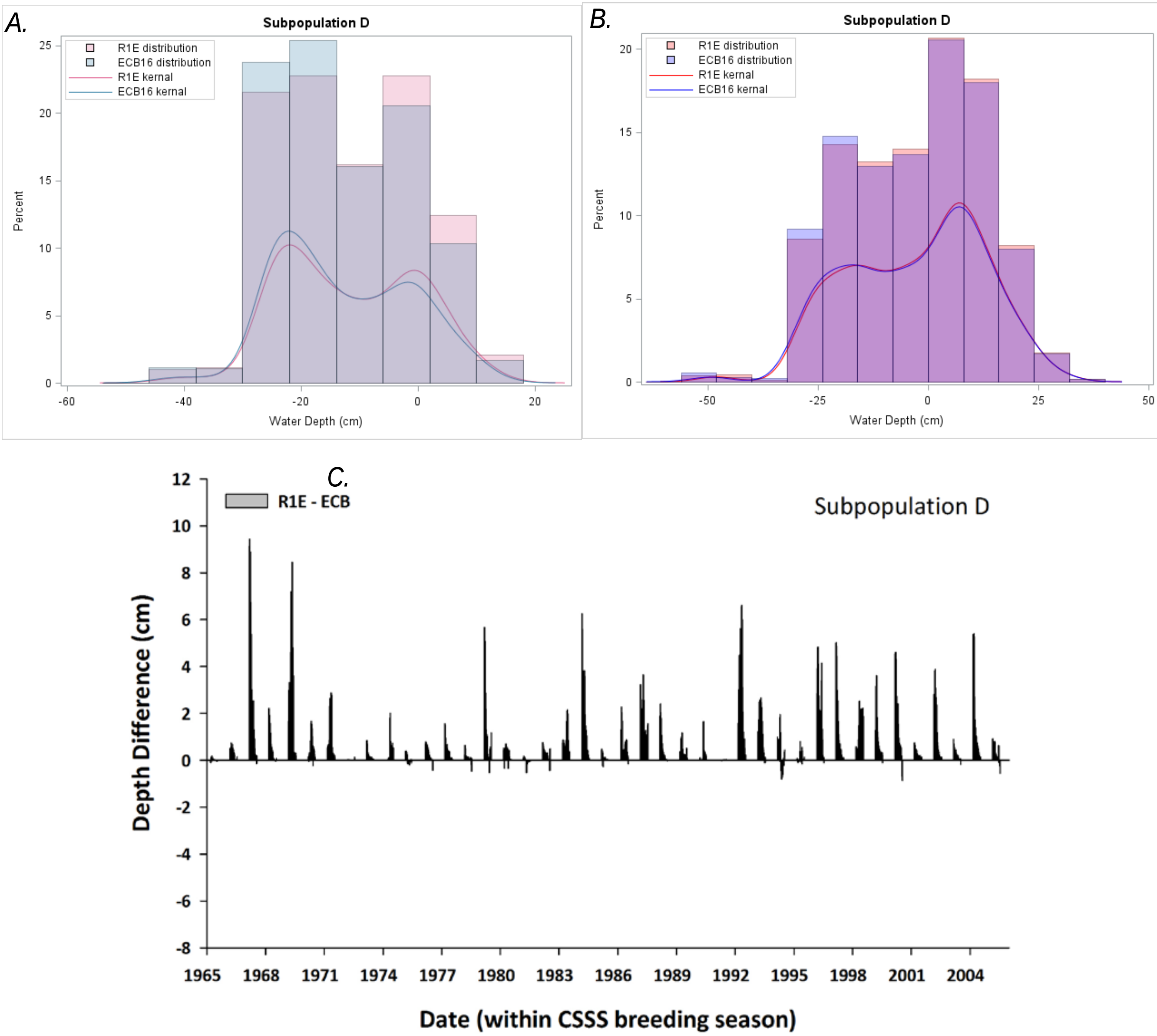


Figure 40. Graphs showing distribution and kernal probability curve of mean subpopulation water depths during, *A*, early (Mar–Apr) and, *B*, late (May–July 15) breeding seasons, and *C*, daily difference in water depth between the R1E scenario and baseline condition (ECB), in subpopulation D. [cm, centimeter; CSSS, Cape Sable seaside sparrow]

Table 1. Description of water management scenarios modeled by the South Florida Water Management District.

[WCA, water conservation area; ENP, Everglades National Park; SFWMD, South Florida Water Management District; CSSS, Cape Sable seaside sparrow]

Scenario name	Description of scenario
Existing conditions baseline (ECB)	Update previous base condition runs developed for Central Everglades Planning Process (CEPP) and South Dade Investigation for current features and Everglades Restoration Transition Plan operations. Priority use of S–333 for WCA–3A Rainfall Plan deliveries, followed by S–12D, S–12C, S–12B, S–12A, L–28 Tie–Back Levee gaps and L–28 Canal Old Tamiami Trail Borrow Canal, with Tram Road east–west culvert S–12 gate overtopping if headwater stage exceeds 11.0 feet.
R2F	January through December closure period for S–12A, S–343A, S–343B and S–344; closure of S–12B from October 1 through August 16.
R2G2	Conditional closures of S–12A, S–12B, S–343A, S–343B and S–344 based on antecedent conditions in WCA–3A and sparrow breeding opportunity. Structures tend to open as stages increase at 3A–28 (should also help to avoid “overtopping” operations), tend to close during La Niña, neutral, and weak El Niño years.
R2H	Early dry season operations (Sep-Dec) informed by SFWMD South Dade study to promote more flow toward ENP and extend hydroperiods; look for later dry season opportunity (Feb-May) to move water toward Biscayne National Park and away from CSSS populations; attempt to avoid water-level excursion above ground surface March 1 to July 15 because of operation of eastern infrastructure (S–332s, S–200s, S–199s).
R1E	Closure of the ENP Tram Road borrow-canal connection, and January through December closure period for S–12A, S–12B, S–343A, S–343B, and S– 344.

Table 2. Timespan and description of Cape Sable seaside sparrow variables processed to evaluate scenarios.
[cm, centimeter; SD, standard deviation]

Variable	Span	Description
Depth mean of subpopulation	1 day	Depth average of subpopulation
Consecutive dry days	1 breeding season	Count of consecutive days with depth > 0 cm
Mean hydroperiod	4 years	Mean count of days in year with depth > 0 cm
Hydroperiod variability	4 years	SD of days in year with depth > 0 cm