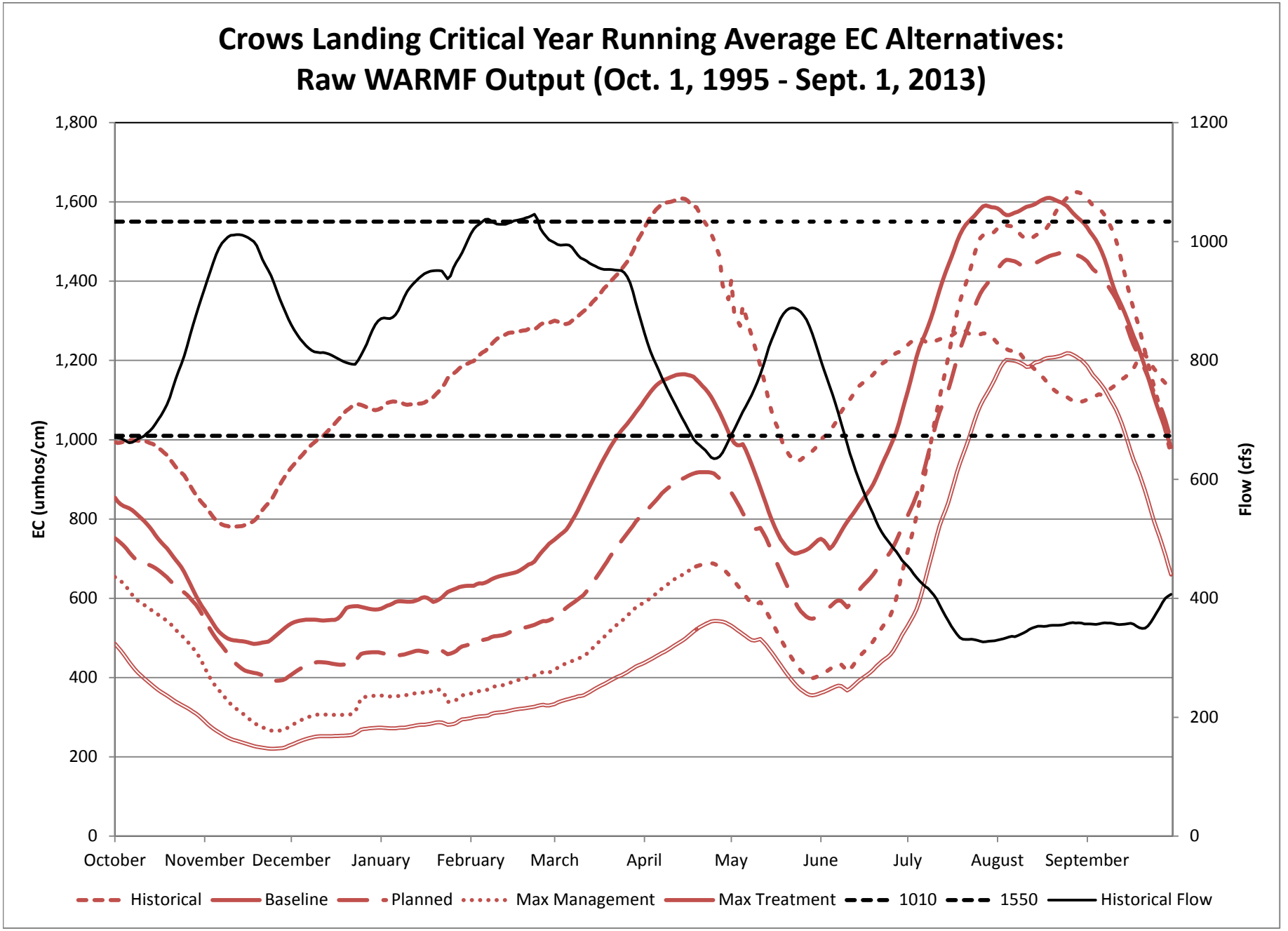
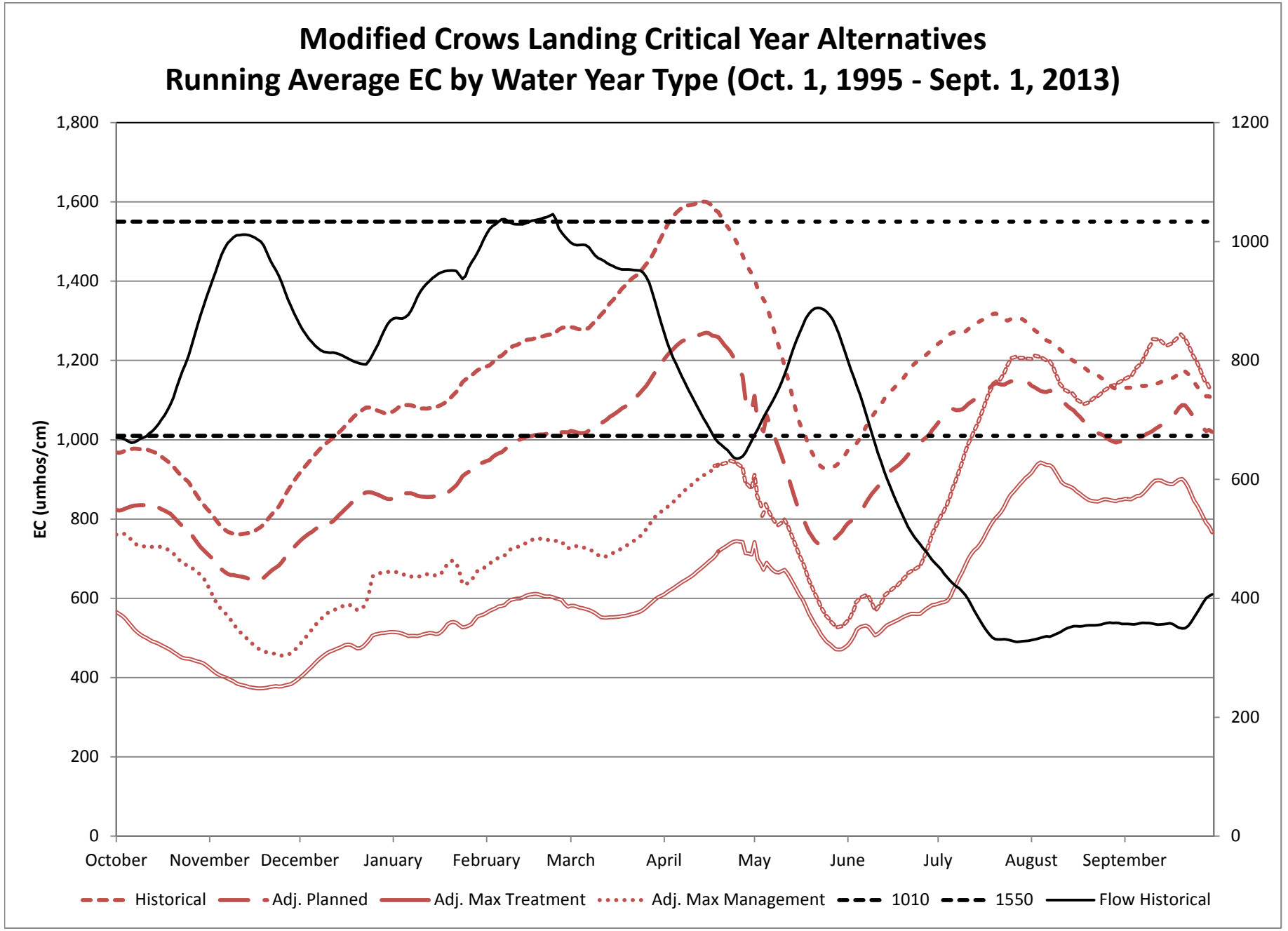
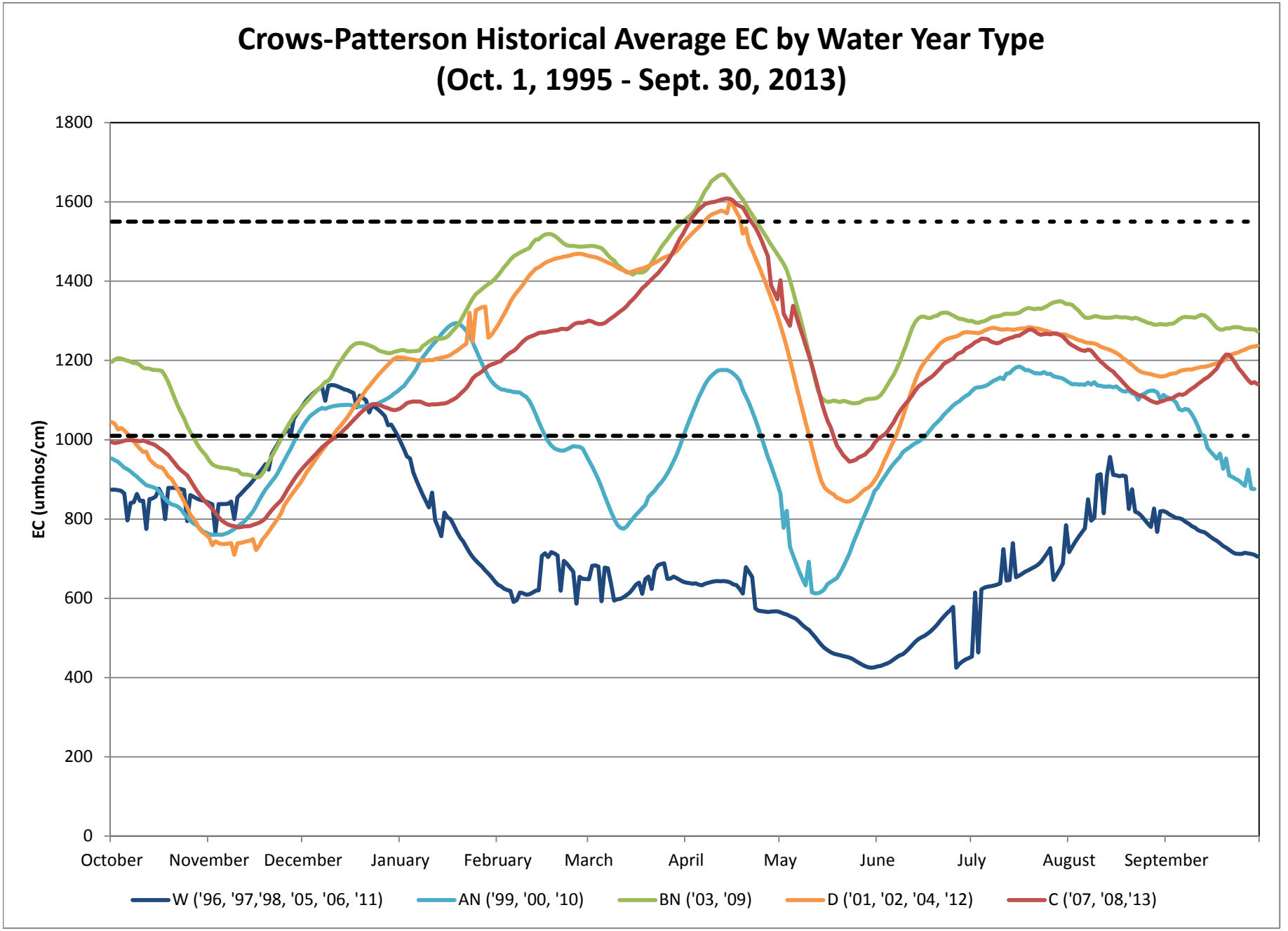
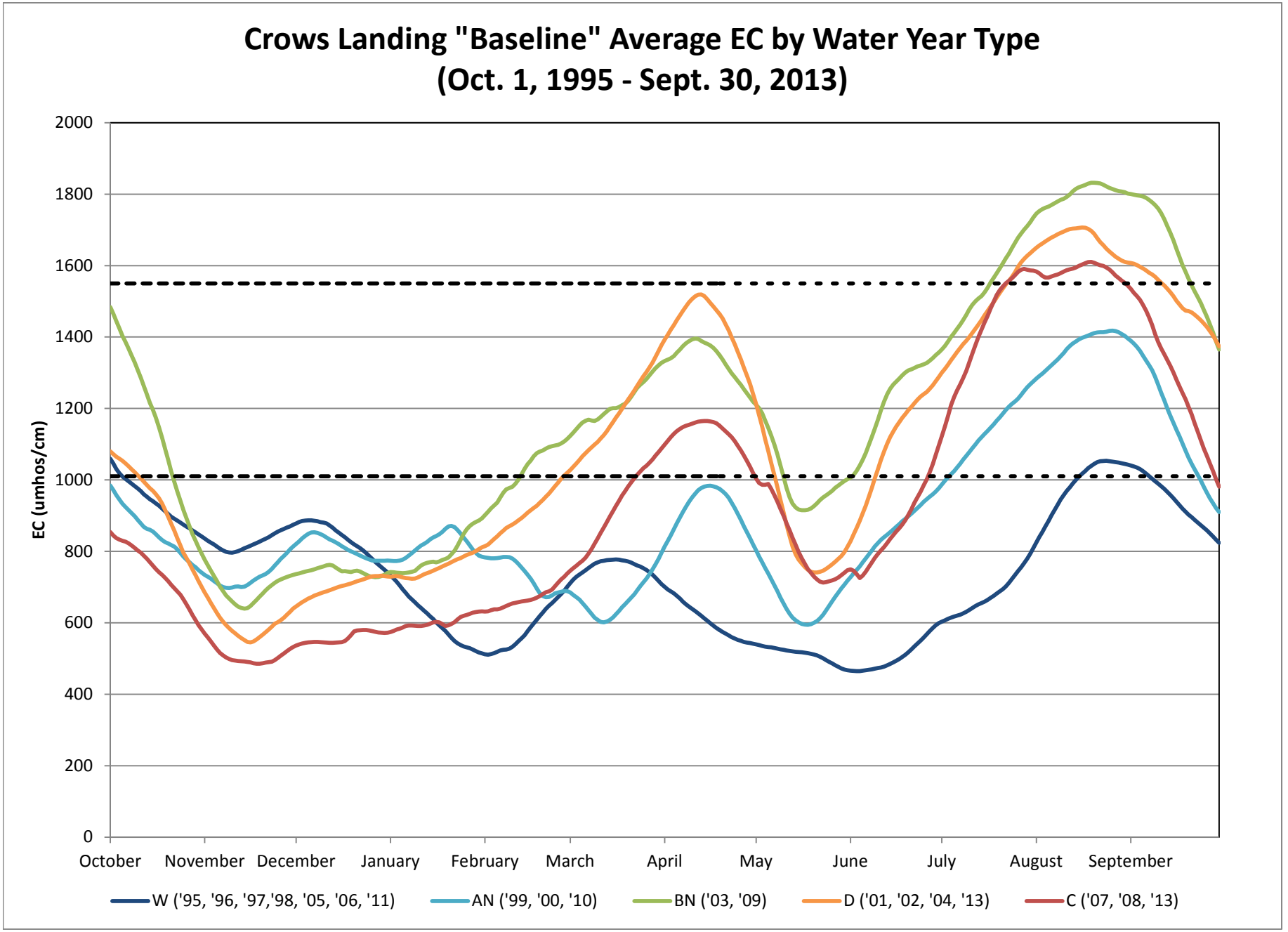
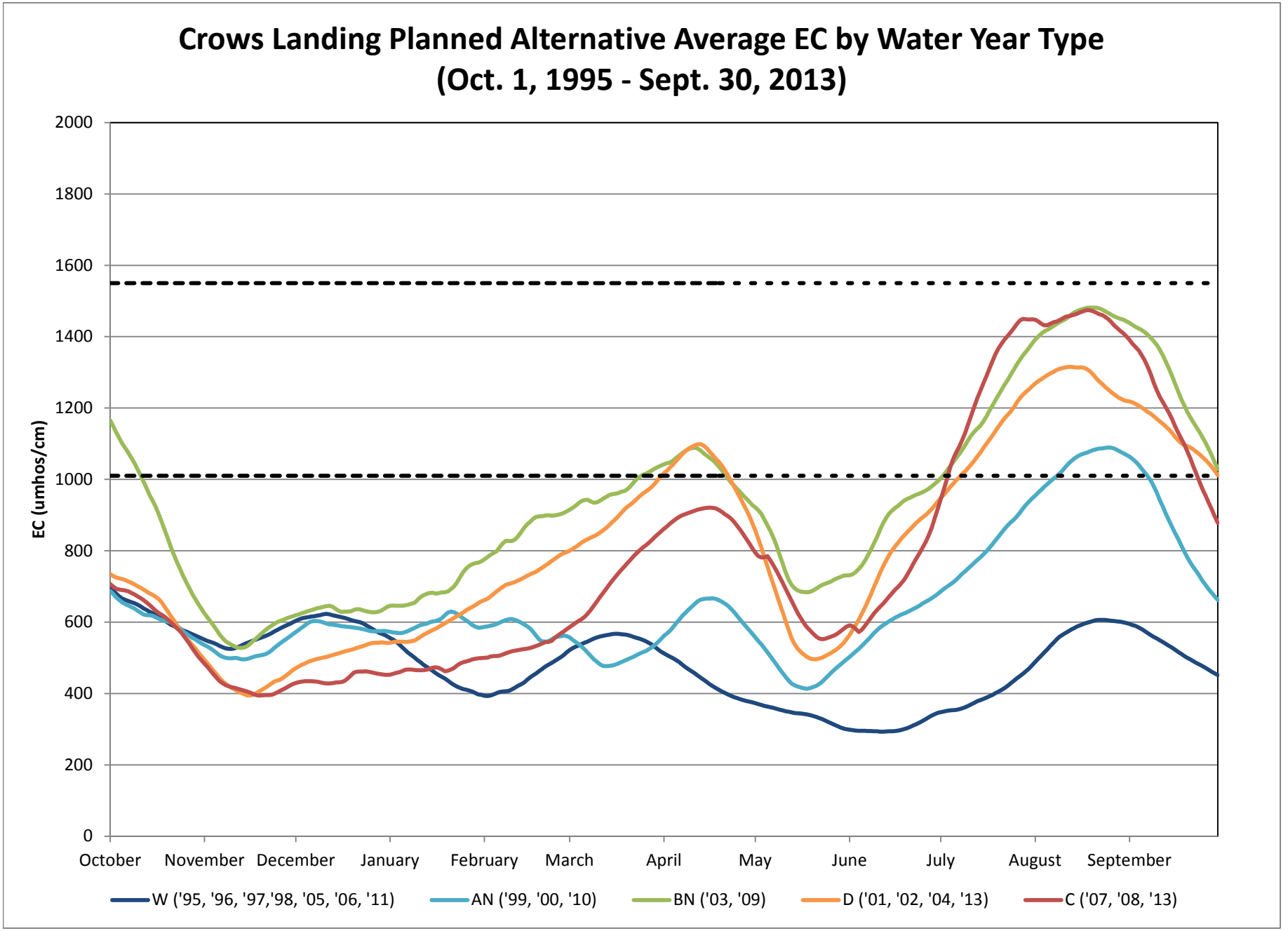

Crows Landing Critical Year Running Average EC Alternatives:
Raw WARMF Output (Oct. 1, 1995 - Sept. 1, 2013)
EC (umhos/cm)
Flow (cfs)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Baseline
Planned
Max Management
Max Treatment
1010
1550
Historical Flow

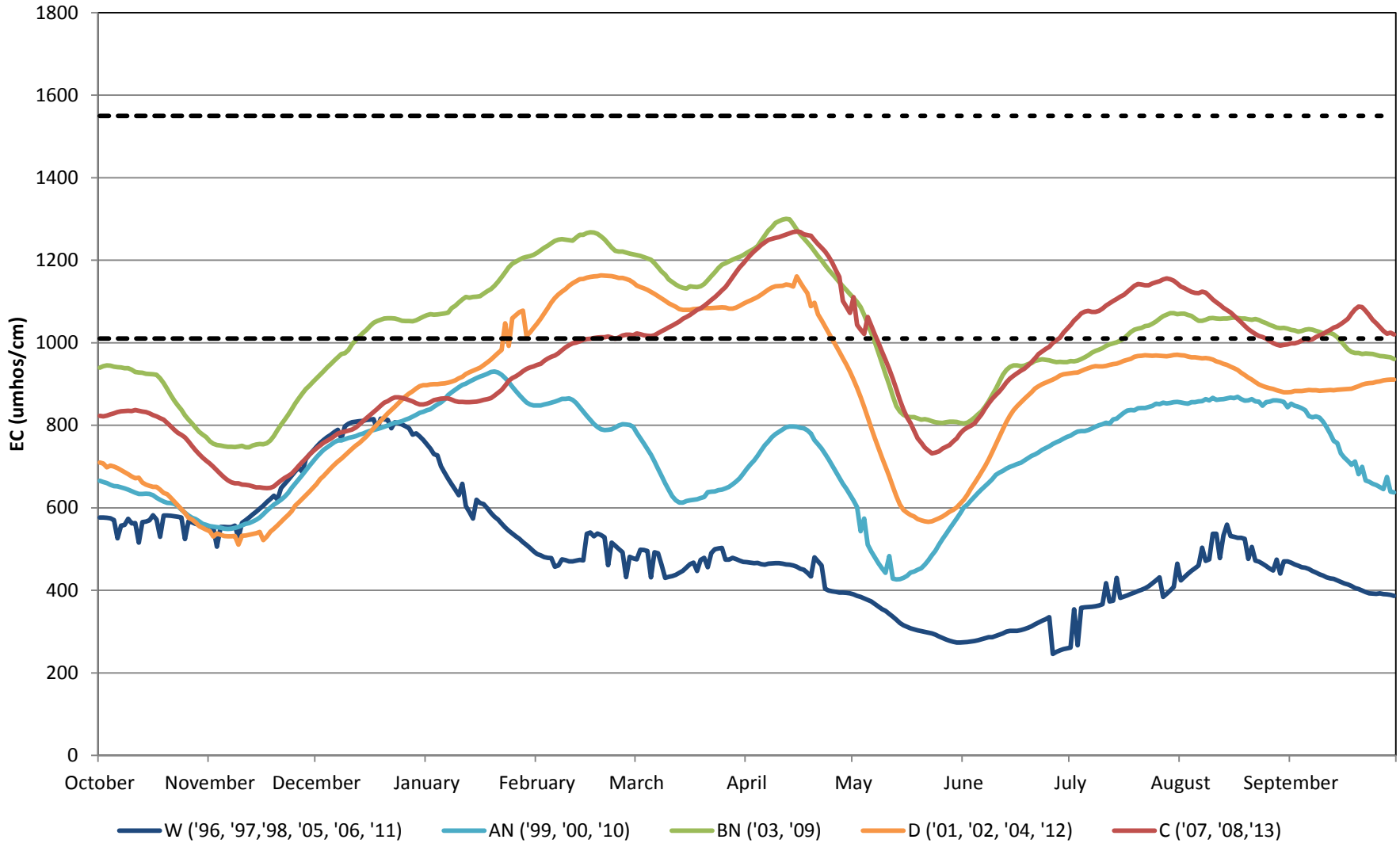

Modified Crows Landing Critical Year Alternatives
Running Average EC by Water Year Type (Oct. 1, 1995 - Sept. 1, 2013)
EC (umhos/cm)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Adj. Planned
Adj. Max Treatment
Adj. Max Management
1010
1550
Flow Historical

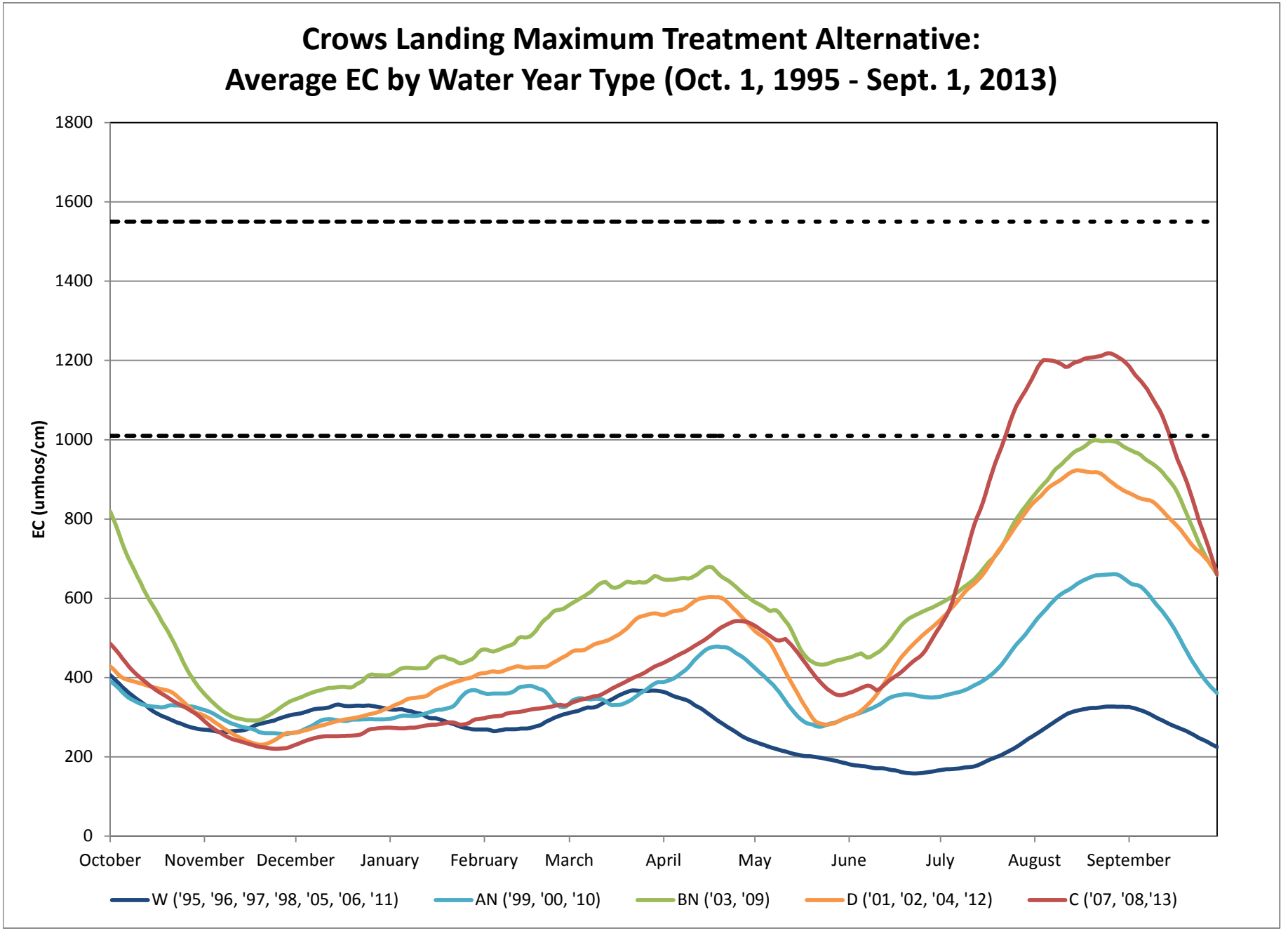

Crows-Patterson Historical Average EC by Water Year Type
(Oct. 1, 1995 - Sept. 30, 2013)
EC (umhos/cm)
1800
1600
1400
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
W ('96, '97,'98, '05, '06, '11)
AN ('99, '00, '10)
BN ('03, '09)
D ('01, '02, '04, '12)
C ('07, '08,'13)


Crows Landing "Baseline" Average EC by Water Year Type
(Oct. 1, 1995 - Sept. 30, 2013)
EC (umhos/cm)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
W ('95, '96, '97,'98, '05, '06, '11)
AN ('99, '00, '10)
BN ('03, '09)
D ('01, '02, '04, '13)
C ('07, '08, '13)

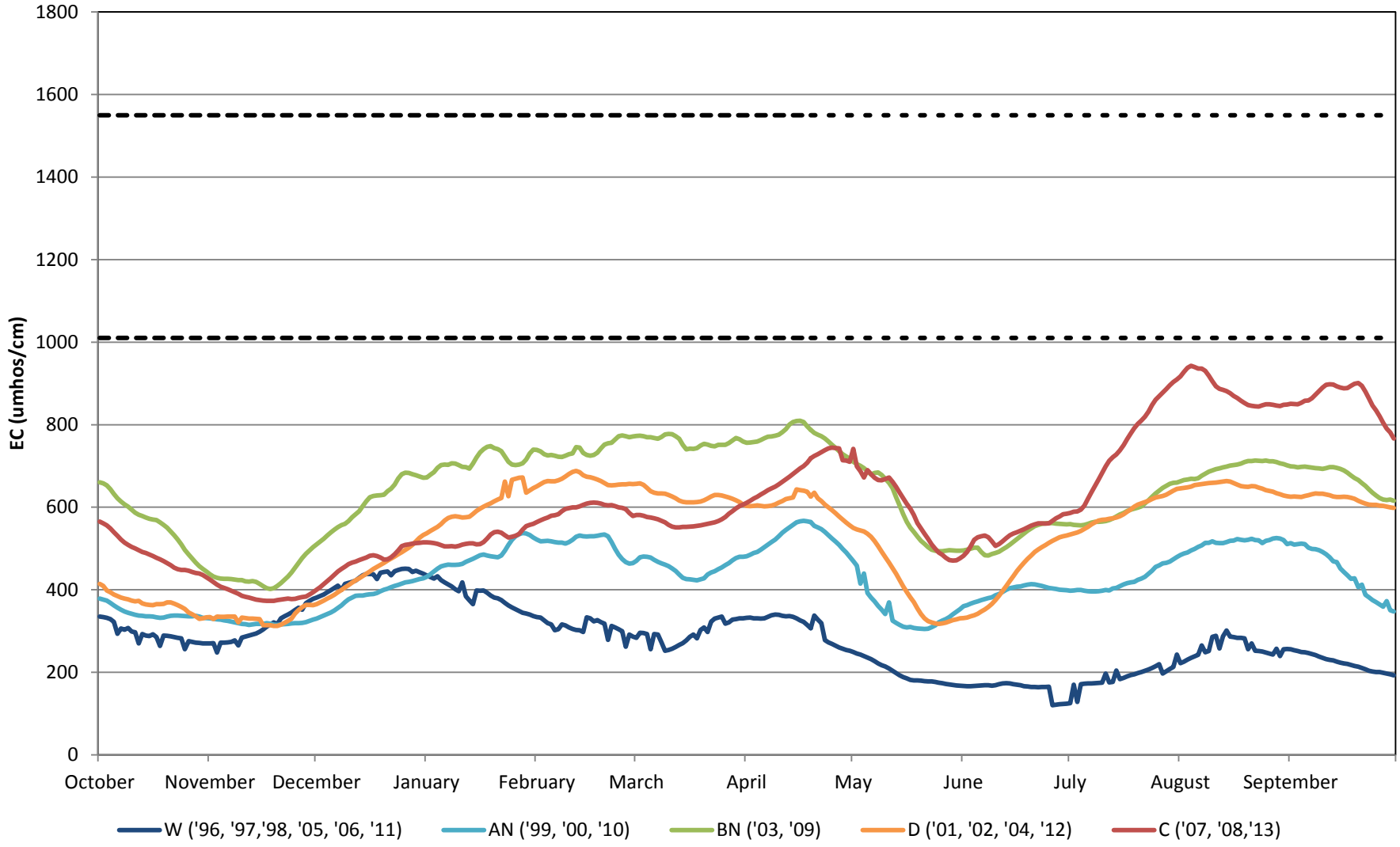

Crows Landing Planned Alternative Average EC by Water Year Type
(Oct. 1, 1995 - Sept. 30, 2013)
EC (umhos/cm)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
W ('95, '96, '97,'98, '05, '06, '11)
AN ('99, '00, '10)
BN ('03, '09)
D ('01, '02, '04, '13)
C ('07, '08, '13)

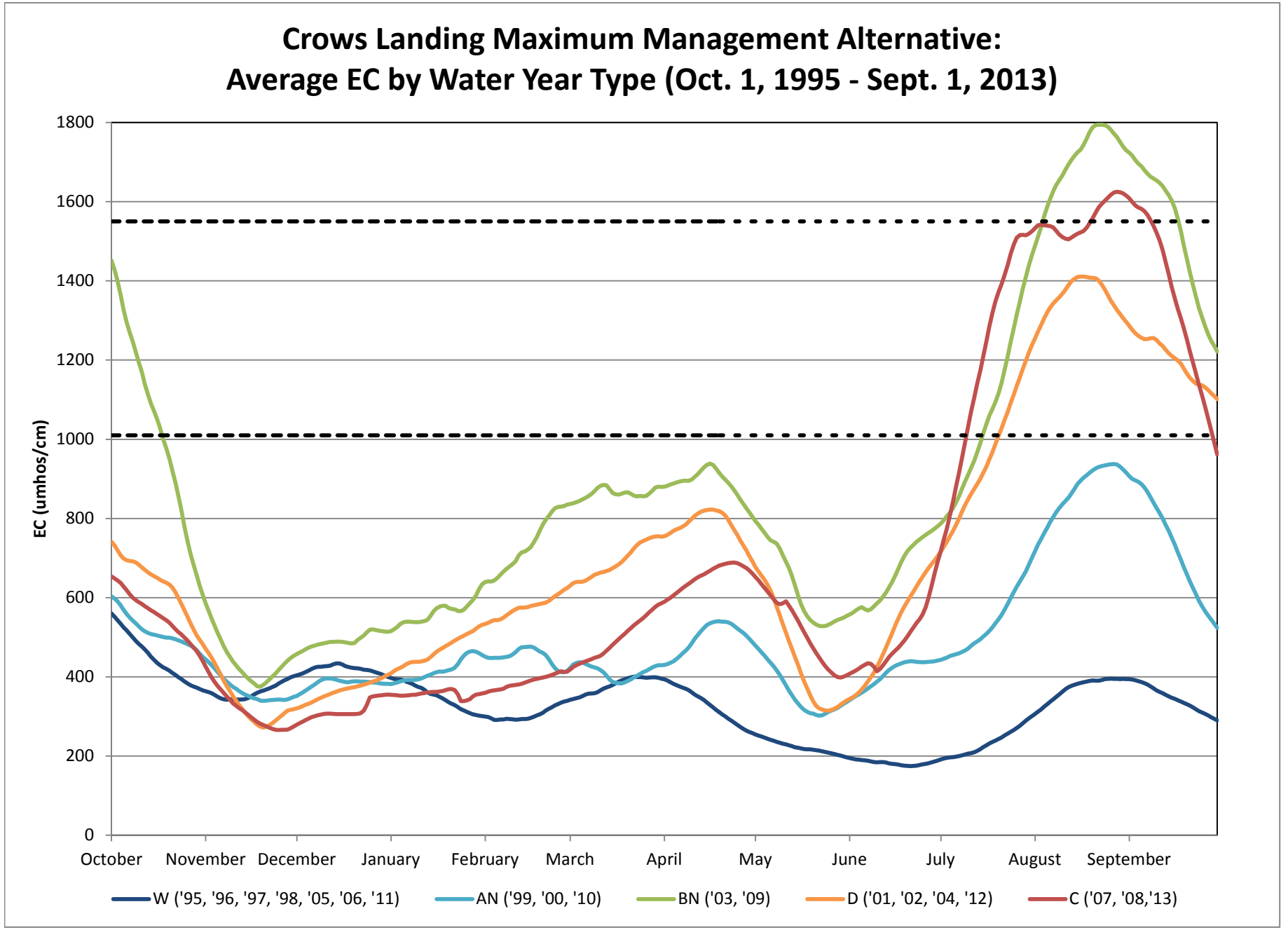
Crows-Patterson Planned Alternative salinity changes to Historical EC by Water Year Type (Oct. 1, 1995 - Sept. 30, 2013)



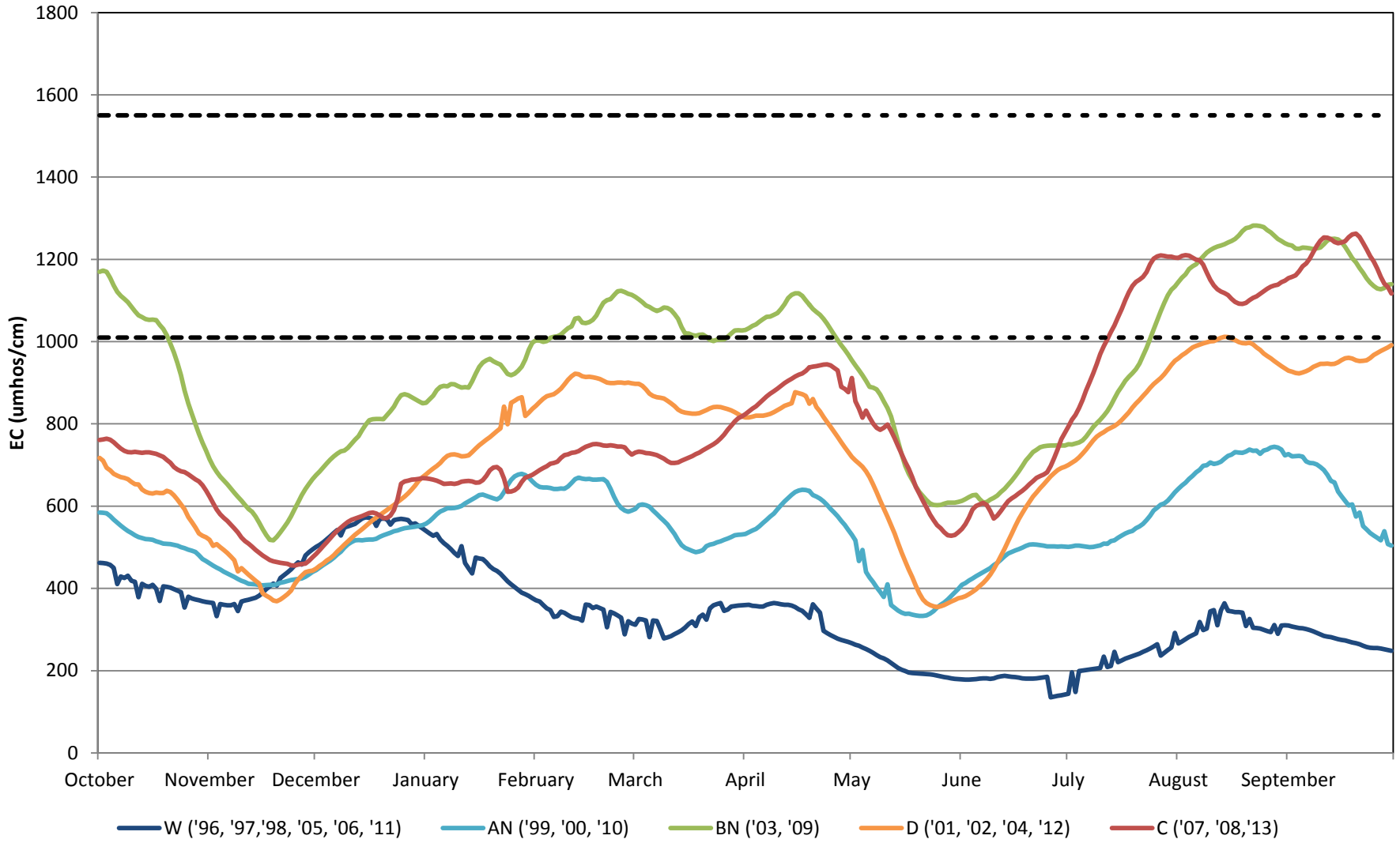

Crows Landing Maximum Treatment Alternative:
Average EC by Water Year Type (Oct. 1, 1995 - Sept. 1, 2013)
EC (umhos/cm)
1800
1600
1400
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
W ('95, '96, '97, '98, '05, '06, '11)
AN ('99, '00, '10)
BN ('03, '09)
D ('01, '02, '04, '12)
C ('07, '08,'13)

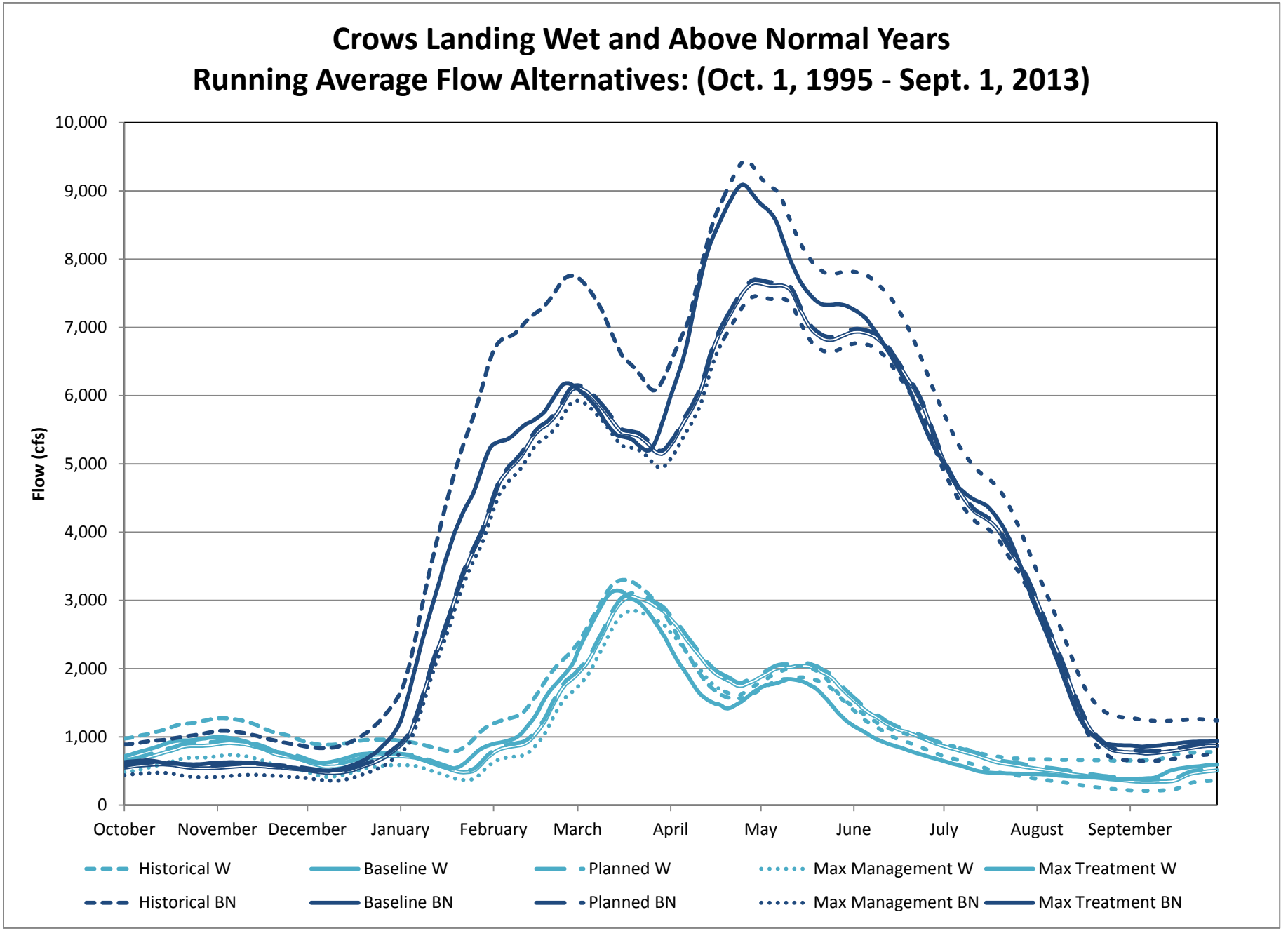
Crows-Patterson Max Treatment Alternative salinity changes to Historical EC by Water Year Type (Oct. 1, 1995 - Sept. 30, 2013)

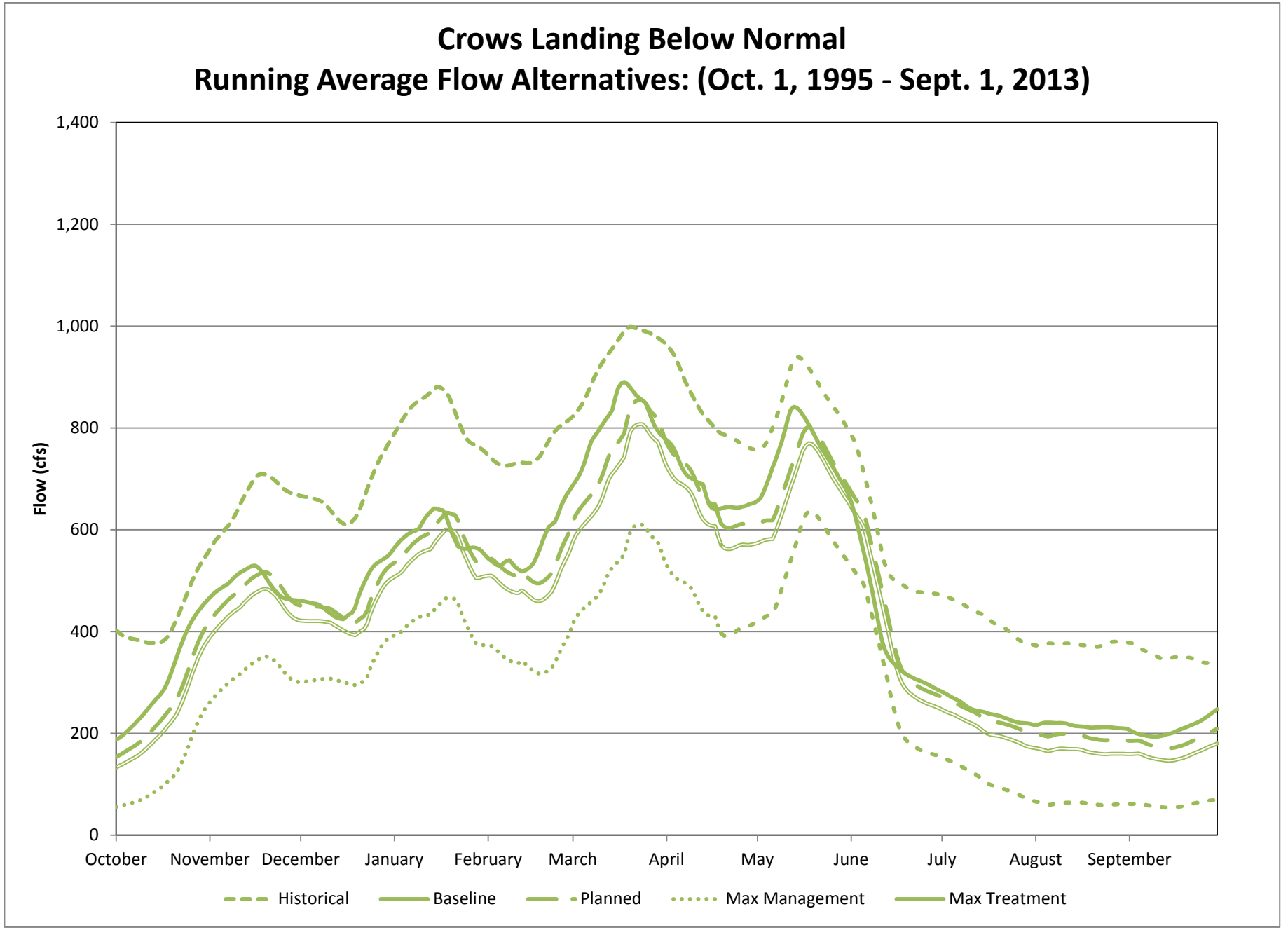



Crows Landing Maximum Management Alternative:
Average EC by Water Year Type (Oct. 1, 1995 - Sept. 1, 2013)
EC (umhos/cm)
1800
1600
1400
1200
1000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
W ('95, '96, '97, '98, '05, '06, '11)
AN ('99, '00, '10)
BN ('03, '09)
D ('01, '02, '04, '12)
C ('07, '08,'13)

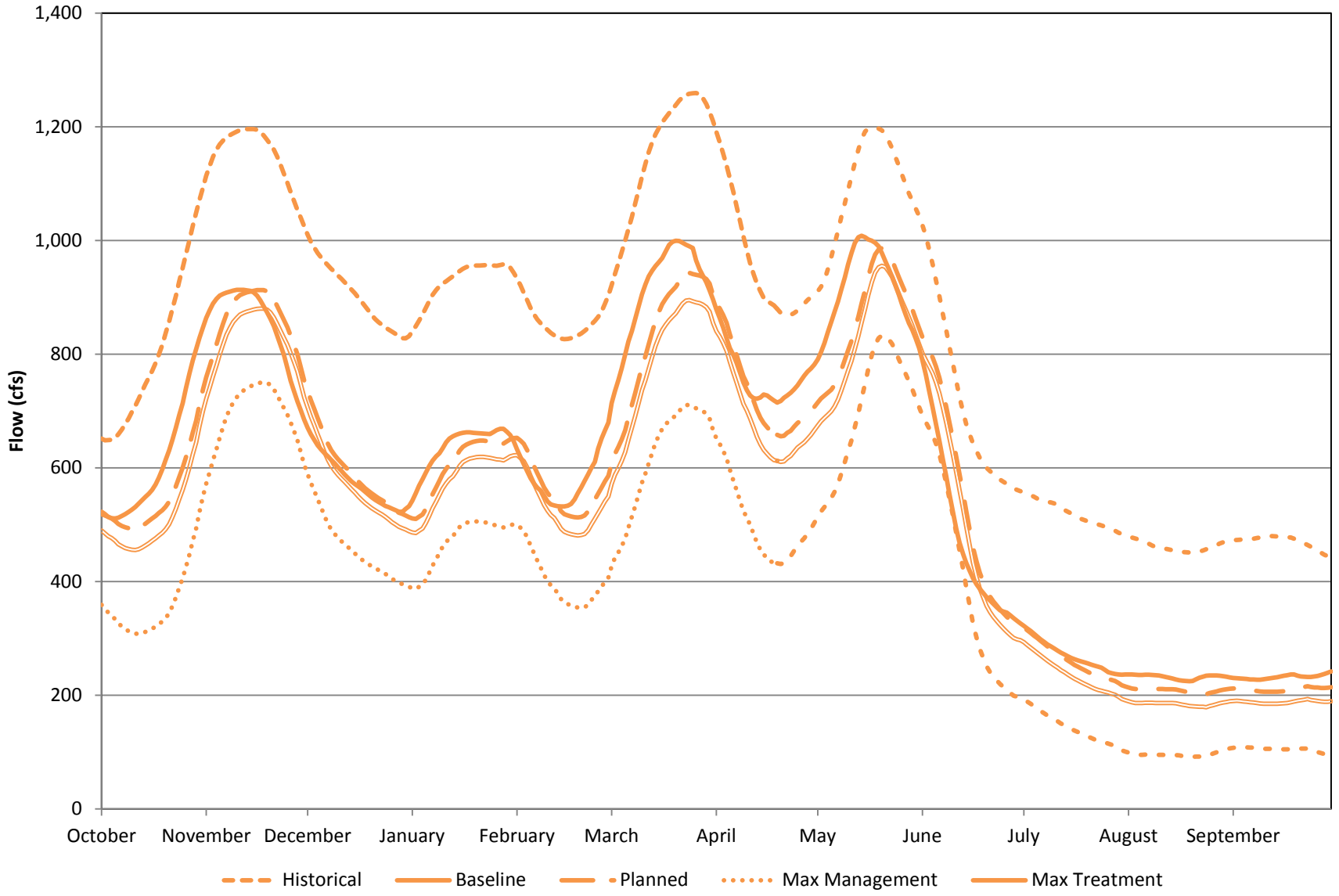
Crows-Patterson Max Management Alternative salinity changes to Historical EC by Water Year Type (Oct. 1, 1995 - Sept. 30, 2013)

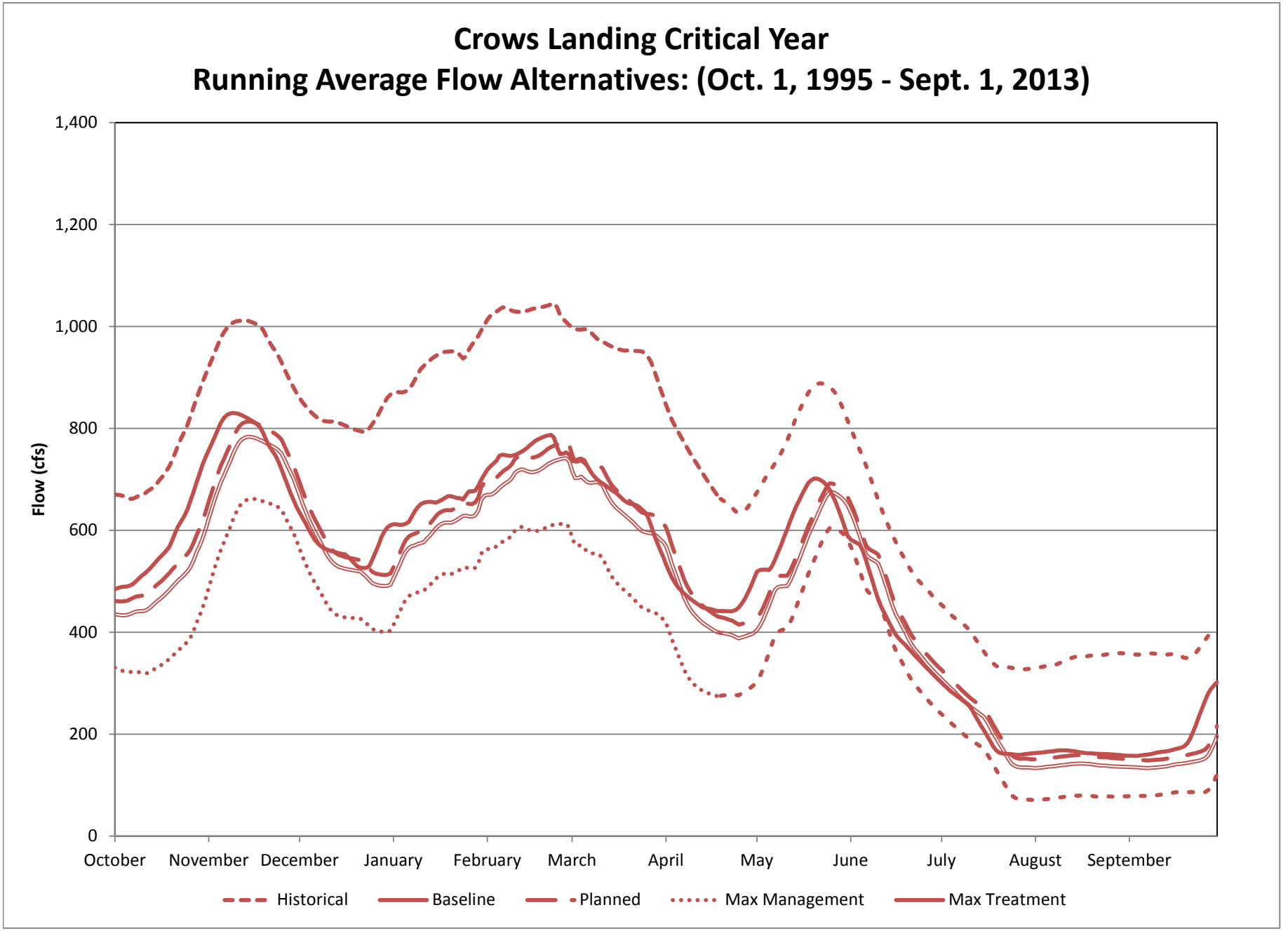



Crows Landing Wet and Above Normal Years
Running Average Flow Alternatives: (Oct. 1, 1995 - Sept. 1, 2013)
Flow (cfs)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical W
Baseline W
Planned W
Max Management W
Max Treatment W
Historical BN
Baseline BN
Planned BN
Max Management BN
Max Treatment BN


Crows Landing Below Normal
Running Average Flow Alternatives: (Oct. 1, 1995 - Sept. 1, 2013)
Flow (cfs)
1,400
1,200
1,000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Baseline
Planned
Max Management
Max Treatment

Crows Landing Dry Year
Running Average Flow Alternatives: (Oct. 1, 1995 - Sept. 1, 2013)




Crows Landing Critical Year
Running Average Flow Alternatives: (Oct. 1, 1995 - Sept. 1, 2013)
Flow (cfs)
1,400
1,200
1,000
800
600
400
200
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Baseline
Planned
Max Management
Max Treatment

DRAFT LSJRC Basin Plan Amendment Planning

General Guidance

Considerations for a Basin Plan Amendment

- Elements for the Staff Report
  - Beneficial Uses
  - Water Quality Objectives
  - Implementation Program
    - Monitoring and Surveillance
  - Consistency with Laws, Plans and Policies
  - Environmental Analysis (Environmental Checklist)
  - Economics

- At LEAST 2 Project Alternatives need to be presented, including a NO ACTION alternative. Multiple implementation options can be considered within each overall project alternative.

- All alternatives that were evaluated through the development process should be presented in the report, but this can be done in an appendix if the list and ranking process is extensive.

- The selection criteria for project alternatives and implementation options should be clearly stated.

- Providing very thorough scientific justification, stating all methods, assumptions, data gaps is critical.

- Economic and Environmental reviews can be done on just the highest ranking alternatives/options and presented in the main portion of the Staff Report.

DRAFT LSJRC Basin Plan Amendment Project Alternatives Matrix

Project Alternatives **EC Water Quality Objective (as measured at Crow's Landing)**	**Technical Basis for the Water Quality Objective**	**Evaluation Criteria (Rating: Y=Criteria is fully met, N=Criteria is partially or not met)**					
		1. Consistent with federal/state laws, plans and policies	**2. Compliant with relevant WQOs downstream (i.e., Vernalis objective)**	**3. Reduced dependency on New Melones Water Quality Releases**	**4. Maximizes salt transport out of basin**	**5. Scientifically Defensible (protects Beneficial Uses)**	**6. Feasible to Implement (see attachment)**
1. No EC Objective	Continue to regulate dischargers pursuant to the Salt and Boron TMDL	N	N or Y?	N	Y	N	Y
2. 1,550 µmhos/cm	Hoffman Model • 15% leaching fraction • Protection of 95% of common crop • 95% yield in all of the 5% driest years	Y	Y	Y	Y	Y	Y
3. 1,350 µmhos/cm	Hoffman Model • Leaching fraction between 10 – 15% • Protection of 95% of common crop • 95% yield in all of the 5% driest years	Y	Y	Y	N	Y	Y
4. 1,010 µmhos/cm	Hoffman Model • 10% leaching fraction • Protection of 95% of common crop • 95% yield in all of the 5% driest years	Y	Y	Y	N	Y	N
5. 700 µmhos/cm	Ayers and Westcot	N	Y	Y	N	Y	N
6. 1,350 µmhos/cm & 1,550 µmhos/cm during critical dry years	Hoffman Model • 1,350 µmhos/cm has same technical basis as WQO option #3 • 1,550 µmhos/cm has same technical basis as WQO option #2	Y	Y	Y	Y	Y	Y

DRAFT Selection Criteria for the Water Quality Objective Alternatives

The Basin Plan Amendment project alternatives were evaluated based on their ability to meet the following primary selection criteria:

1. Maintain consistency with federal and state water quality laws, plans and policies as applicable

   Regulations that apply to WQOs

   a. Federal Regulations and Guidance

      i. Federal regulations require States to adopt narrative or numeric water quality criteria to protect designated beneficial uses (40 CFR §131.11(a)(1).)

   b. State Regulations and Guidance

      i. Water Code section13050, subdivision (h) defines water quality objectives as "…the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

      ii. Water Code section 13241

   c. Antidegradation Policy

   Regulations to establish an implementation program

   a. Federal Regulations and Guidance

      i. Section 402 of the Clean Water Act requires a permitting system which USEPA addressed by promulgating 40 Code of Federal Regulations, part 122, which are the regulations pertaining to the NPDES program. The State's regulations pertaining to NPDES permits must be consistent with the federal regulations.

      ii. Title 40 Code of Federal Regulations Section 122.44(d)(1)(ii) sets forth the criteria for establishing a procedure for determining whether a discharge has a reasonable potential to cause or contribute to a violation of water quality standards.

   b. State Regulations and Guidance

      iii. Pursuant to Water Code section 13050, subdivision (j)(3), a basin plan amendment must include an implementation program to achieve water quality objectives.

      iv. Water Code section 13242

      v. State Water Board Sources of Drinking Water Policy (Resolution 88-63) – monitoring

      vi. Recycled Water Policy

      vii. In compliance with Water Code section 106.3, it is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.

2. Assure compliance with relevant water quality objectives downstream (i.e. Vernalis objective)
3. Reduce dependency on New Melones Water Quality Releases
4. Maximize the assimilative capacity of the river to export salt out of the Basin to the Delta and ocean.
5. Provide solid scientific analysis to ensure the appropriate protection of existing and potential future beneficial uses
6. Provide a technically feasible, economically viable, and reasonable solution for the implementation of the water quality standards

DRAFT LSJRC Basin Plan Amendment Project Alternatives Matrix
Implementation Actions

Project Alternatives **EC Water Quality Objective (as measured at Crow's Landing)**	**Technical Basis for the Water Quality Objective**	**Types of Required Actions (or Equivalent) Necessary to Meet WQOs**	**Selection Criteria (Rating: Y=Criteria is fully met, N=Criteria is partially or not met)**		
			1. Technically Feasible	**2. Economically Viable**	**3. Implementation Achievable**
1. No EC Objective	Continue to regulate dischargers pursuant to the Salt and Boron TMDL	No Additional Action	Y	Y	Y
2. 1,550 µmhos/cm	Hoffman Model • 15% leaching fraction • Protection of 95% of common crop • 95% yield in all of the 5% driest years	Planned bundle activities: • Controlled timing of salinity discharges (RTM) • 3% reduction in POTW loads • 10% reduction in application of fertilizers and soil amendments • No releases from Grasslands Bypass Project • Planned Tailwater/tilewater recovery	Y	Y	Y
3. 1,350 µmhos/cm	Hoffman Model • Leaching fraction between 10 – 15% • Protection of 95% of common crop • 95% yield in all of the 5% driest years	Same actions as WQO option #2	Y	Y	Y
		Same actions as WQO option #2 plus • Maximum Management	Y	N	N
4. 1,010 µmhos/cm	Hoffman Model • 10% leaching fraction • Protection of 95% of common crop • 95% yield in all of the 5% driest years	Same actions as WQO option #2 plus • Regional treatment facility	Y	N	N
		Same actions as WQO option #2 plus • Storage reservoir(s) used for timed releases	Y	N	N
5. 700 µmhos/cm	Ayers and Westcot	More than WQO option #4	N	N	N
6. 1,350 µmhos/cm & 1,550 µmhos/cm during critical dry years	Hoffman Model • 1,350 µmhos/cm has same technical basis as WQO option #3 • 1,550 µmhos/cm has same technical basis as WQO option #2	Same actions as WQO option #2	Y	Y	Y

DRAFT Selection Criteria for the Water Quality Objective - Implementation Alternatives

The Basin Plan Amendment project alternatives were evaluated based on their ability to meet the following primary selection criteria:

1. Technically feasible
    a. Technologies are readily available/adaptable
    b. Ability to meet WQOs and load allocations or WQ achieved in river
    c. Provides for flexibility to growers and wetland operators
    d. Flexible/adaptable to climate changes/water year types
2. Economically viable
    a. Relative Capital and O&M costs
3. Implementation achievability
    a. Potential environmental issues
    b. Time period for planning/design/construction
    c. Legal/regulatory/institutional hurdles
    d. Time to implement
    e. Action within authority of implementing agency