APPENDIX A1
DESCRIPTION

REGULATED PORTION OF EVERGLADES AGRICULTURAL AREA
~~S-5A, S-6, S-7 AND S-8~~ BASINS
PALM BEACH, BROWARD AND HENDRY COUNTIES

Indicated below are the approximate boundaries of the Everglades Agricultural Area (EAA) basins included in the regulated acreage of the EAA represented by the base period water quality and flow dataset described in Appendix 3:

S-5A BASIN (Palm Beach County)

Beginning at the intersection of the center line of the South Florida Water Management District's Levee 8 Right of Way with the north line of Section 22, Township 41 South, Range 38 East, thence, bear westerly along said north line of said Section 22 and the north lines of Sections 21, 20 and 19, Township 41 South, Range 38 East, and the north line of Section 24, Township 41 South, Range 37 East, to the Northwest (NW) corner of said Section 24;

Thence, southerly along the west line of said Section 24 to the Southwest (SW) corner of said Section 24;

Thence, westerly along the south lines of Sections 23 and 22, Township 41 South, Range 37 East, to the intersection thereof with the center line of the South Florida Water Management District's Levee Dike 9 Right of Way;

Thence, southwesterly along said center line of said Levee Dike 9 Right of Way to the intersection thereof with the west line of Section 4, Township 42 South, Range 37 East;

Thence, southerly along said west line of said Section 4 and the west lines of Sections 9, 16, 21, 28 and 33, Township 42 South, Range 37 East, to the intersection thereof with the line between Townships 42 South and 43 South, said point being also the Southwest (SW) corner of said Section 33;

Thence, easterly along said line between said Townships 42 South and 43 South, being also the south line of said Section 33 and the south lines of Sections 34, 35 and 36, Township 42 South, Range 37 East, and the south lines of Sections 31, 32 and 32, Township 42 South, Range 38 East, to the Northeast (NE) corner of Section 4, Township 43 South, Range 38 East;

Thence, southerly along the east line of said Section 4 to the Southeast (SE) corner of said Section 4;

Thence, easterly along the south line of Section 3, Township 43 South, Range 38 East, to the Southeast (SE) corner of said Section 3;

Thence, southerly along the east lines of Sections 10, 15, 22 and 27, Township 43 South, Range 38 East, to the Southeast (SE) corner of said Section 27;

Thence, westerly along the south line of said Section 27 to the Northwest (NW) corner of Section 34, Township 43 South, Range 38 East;

Thence, southerly along the west line of said Section 34 to the intersection thereof with the line between Township 43 South and Government Lots 3 and 4, said point being also the Southwest (SW) corner of said Section 34;

Thence, southerly along the southerly extension of said Section 34 to the intersection thereof with the center line of State Road 80 (U.S. 441) Right of Way;

Thence, easterly along said center line of said State Road 80 (U.S. 441) Right of Way to the intersection thereof with the west line of the East one-half (E1/2) of Section 3, Township 44 South, Range 38 East;

Thence, southerly along the west line of said East one-half (E1/2) of said Section 3, and the west line of the East one-half (E1/2) of Section 10, Township 44 South, Range 38 East, to the Southwest (SW) corner of said East one-half (E1/2) of said Section 10;

Thence, easterly along the south line of said Section 10 to the Northwest (NW) corner of Section 14, Township 44 South, Range 38 East;

Thence, southerly along the west line of said Section 14 and the west line of Section 23, Township 44 South, Range 38 East, to the Southwest (SW) corner of said Section 23;

Thence, easterly along the south line of said Section 23 and the south line of Section 24, Township 44 South, Range 38 East, to the intersection thereof with the line between Ranges 38 East and 39 East, said point being also the Southeast (SE) corner of said Section 24;

Thence, southerly along said line between said Ranges 38 East and 39 East, being also the east lines of Sections 25 and 36, Township 44 South, Range 38 East, to the intersection thereof with the line between Townships 44 South and 45 South, said point being also the Southeast (SE) corner of said Section 36;

Thence, easterly along said line between said Townships 44 South and 45 South, being also the south lines of Sections 31, 32 and 33, Township 44 South, Range 39 East, to the Southeast (SE) corner of said Section 33;

Thence, northerly along the east line of said Section 33 and the east lines of Sections 28, 21 and 16, Township 44 South, Range 39 East, to the Northeast (NE) corner of said Section 16;

Thence, easterly along the south lines of Sections 10 and 11, Township 44 South, Range 39 East, to the Southeast (SE) corner of said Section 11;

Thence, northerly along the east line of said Section 11 to the Northwest (NW) corner of the South one-half (S1/2) of Section 12, Township 44 South, Range 39 East;

Thence, easterly along the north line of said South one-half (S1/2) of said Section 12 to the intersection thereof with the center line of the South Florida Water Management District's Levee 7 Right of Way;

Thence, northeasterly and easterly along said center line of said Levee 7 Right of Way to the intersection thereof with the center line of said Levee 8 Right of Way;

Thence, northerly and northwesterly along said center line of said Levee 8 Right of Way to the intersection thereof with the north line of Section 22, Township 42 South, Range 39 East;

Thence, westerly along said north line of said Section 22 and the north line of Section 21, Township 42 South, Range 39 East, to the Northwest (NW) corner of said Section 21;

Thence, northerly along the east line of Section 17 and the east line of Section 8, Township 42 South, Range 39 East, to the intersection thereof with the center line of said Levee 8 Right of Way;

Thence, northwesterly along said center line of said Levee 8 Right of Way to the POINT OF BEGINNING.

S-6 BASIN and the East Portion of the S2 BASIN (Palm Beach County)

Beginning at the Southwest (SW) corner of Section 16, Township 43 South, Range 37 East, thence, bear easterly along the south line of said Section 16 and the south lines of Sections 15, 14 and 13, Township 43 South, Range 37 East, to the Southeast (SE) corner of said Section 13;

Thence, northerly along the east line of said Section 13 and the east lines of Sections 12 and 1, Township 43 South, Range 37 East, to the intersection thereof with the line between Townships 42 South and 43 South, said point being also the Northeast (NE) corner of said Section 1;

Thence, easterly along said line between said Townships 42 South and 43 South, being also the north lines of Sections 6, 5 and 4, Township 43 South, Range 38 East, to the Northeast (NE) corner of said Section 4;

Thence, southerly along the east line of said Section 4 to the Southeast (SE) corner of said Section 4;

Thence, easterly along the north line of Section 10, Township 43 South, Range 38 East, to the Northeast (NE) corner of said Section 10;

Thence, southerly along the east line of said Section 10 and the east lines of Sections 15, 22 and 27, Township 43 South, Range 38 East, to the Southeast (SE) corner of said Section 27;

Thence, westerly along the south line of said Section 27 to the Southwest (SW) corner of said Section 27;

Thence, southerly along the west line of Section 34, Township 43 South, Range 38 East, to the intersection thereof with the line between Township 43 South and Government Lots 3 and 4, said point being also the Southwest (SW) corner of said Section 34;

Thence, southerly along the southerly extension of said Section 34 to the intersection thereof with the center line of State Road 80 (U.S. 441) Right of Way;

Thence, easterly along said center line of said State Road 80 (U.S. 441) Right of Way to the intersection thereof with the west line of the East one-half (E1/2) of Section 3, Township 44 South, Range 38 East;

Thence, southerly along the west line of said East one-half (E1/2) of said Section 3 and the west line of the East one-half (E1/2) of Section 10, Township 44 South, Range 38 East, to the Southwest (SW) corner of said East one-half (E1/2) of said Section 10;

Thence, easterly along the south line of said Section 10 to the Northwest (NW) corner of Section 14, Township 44 South, Range 38 East;

Thence, southerly along the west line of said Section 14 and the west line of Section 23, Township 44 South, Range 38 East, to the Southwest (SW) corner of said Section 23;

Thence, easterly along the south line of said Section 23 and the south line of Section 24, Township 44 South, Range 38 East, to the intersection thereof with the line between Ranges 38 East and 39 East, said point being also the Southeast (SE) corner of said Section 24;

Thence, southerly along said line between said Ranges 38 East and 39 East, being also the east lines of Sections 25 and 36, Township 44 South, Range 38 East, to the intersection thereof with the line between Townships 44 South and 45 South, said point being also the Southeast (SE) corner of said Section 36;

Thence, easterly along said line between said Townships 44 South and 45 South, being also the south line of said section 36 and the south lines of Sections 31, 32, 33 and 34, Township 44 South, Range 39 East, to the intersection thereof with the center line of the South Florida Water Management District's Levee 7 Right of Way;

Thence, southerly along said center line of said Levee 7 Right of Way to the intersection thereof with the center line of the South Florida Water Management District's Levee 6 Right of Way;

Thence, southwesterly along said center line of said Levee 6 Right of Way to the intersection thereof with the north line of Section 30, Township 46 South, Range 39 East;

Thence, westerly along the north line of said Section 30 and the north lines of Sections 25 and 26, Township 46 South, Range 38 East, to the Northwest (NW) corner of the East one-half (E1/2) of said Section 26;

Thence, southerly along the west line of said East one-half (E1/2) of said Section 26 to the Southwest (SW) corner of said East one-half of said Section 26;

Thence, westerly along the south line of said Section 26 and the south line of Section 27, Township 46 South, Range 38 East, to the Southwest (SW) corner of said Section 27;

Thence, northerly along the west line of said Section 27 and the west lines of Sections 22, 15 and 10, Township 46 South, Range 38 East, to the Northwest (NW) corner of the South one-half (S1/2) of said Section 10;

Thence, westerly along the north line of the South one-half (S1/2) of Section 9, Township 46 South, Range 38 East, to the Northwest (NW) corner of said South one-half (S1/2) of said Section 9;

Thence, northerly along the west line of said Section 9, the west line of Section 4, Township 46 South, Range 38 East, and Government Lot 4, to the intersection thereof with the line between Township 45 South and the Government Lots, said point being also the Northwest (NW) corner of said Government Lot 4;

Thence, westerly along said line between said Townships 45 South and 46 South, being also the south lines of Sections 32 and 31, Township 45 South, Range 38 East, to the intersection thereof with the line between Ranges 37 East and 38 East, being also the Southwest (SW) corner of said Section 31;

Thence, northerly along said line between said Ranges 37 East and 38 East, being also the west line of said Section 31 and the west lines of Sections 30 and 19, Township 45 South, Range 38 East, to the Southeast (SE) corner of Section 13, Township 45 South, Range 37 East;

Thence, westerly along the south line of said Section 13 to the Southwest (SW) corner of said Section 13;

Thence, northerly along the west line of said Section 13 to the Southeast (SE) corner of Section 11, Township 45 South, Range 37 East;

Thence, westerly along the south line of said Section 11 and the south line of Section 10, Township 45 South, Range 37 East, to the Southwest (SW) corner of said Section 10;

Thence, northerly along the west line of said Section 10, the west line of Section 3, Township 45 South, Range 37 East, and the west lines of Sections 34, 27 and 22, Township 44 South, Range 37 East, to the Northwest (NW) corner of said Section 22;

Thence, easterly along the north line of said Section 22 to the Northeast (NE) corner of said Section 22;

Thence, northerly along the east line of Section 15, Township 44 South, Range 37 East, to the Northeast (NE) corner of said Section 15;

Thence, westerly along the north line of said Section 15 and the north lines of Sections 16 and 17, Township 44 South, Range 37 East, to the center line of County Road 827A Right of Way;

Thence, northerly along said center line of said County Road 827A Right of Way to the intersection thereof with the center line of State Road 80 Right of Way;

Thence, northerly and northeasterly along said center line of said State Road 80 Right of Way to the intersection thereof with the center line of South Florida Water Management District's Hillsboro Canal Right of Way;

Thence, northwesterly along said center line of said Hillsboro Canal Right of Way to the intersection thereof with the center line of the South Florida Conservancy District's Lateral 1-1N Right of Way;

Thence, southwesterly along said center line of said Lateral 1-1N Right of Way to the south line of Section 1, Township 44 South, Range 36 East;

Thence, westerly along the south line of said Section 1 and the south line of Section 2, Township 44 South, Range 36 East, to the intersection thereof with the center line of the South Florida Water Management District's North New River Canal Right of Way;

Thence, northerly along said center line of said North New River Canal to the intersection thereof with the center line of said Hillsboro Canal Right of Way;

Thence, westerly along said center line of said Hillsboro Canal Right of Way to the intersection thereof with the center line of South Florida Water Management District's Levee Dike 2 Right of Way;

Thence, northeasterly along said center line of said Levee Dike 2 Right of Way to a point, said point being 100 feet southwesterly of the center line of the South Florida Water Management District's Structure 12;

Thence, South 52º 00' 00" East (bearing and distance are based on the description of East Shore Drainage District) to the intersection thereof with a line that is 100 feet south of, and parallel to, the south lines of the North one-half (N1/2) of Section 7 and the North one-half (N1/2) of Section 8, Township 43 South, Range 37 East, said intersection point is 4,700 feet west of the east line of said Section 7;

Thence, easterly along said line 100 feet south of said south lines of said North one-half (N1/2) of said Sections 7 and 8, to the east line of said Section 8;

Thence, southerly along said east line of said Section 8 and the west line of Section 16, Township 43 South, Range 37 East, to the Southwest (SW) corner of said Section 16, and the POINT OF BEGINNING.

S-7 BASIN and the West Portion of the S2 BASIN (Palm Beach and Broward Counties)

Beginning at the Northeast (NE) corner of Section 15, Township 44 South, Range 37 East, thence, bear southerly along the east line of said Section 15 to the Southeast (SE) corner of said Section 15;

Thence, westerly along the south line of said Section 15 to the Northwest (NW) corner of Section 22, Township 44 South, Range 37 East;

Thence, southerly along the west line of said Section 22, the west lines of Sections 27 and 34, Township 44 South, Range 37 East, and the west lines of Sections 3 and 10, Township 45 South, Range 37 East, to the Southwest (SW) corner of said Section 10;

Thence, easterly along the south line of said Section 10 and the south line of Section 11, Township 45 South, Range 37 East, to the Southeast (SE) corner of said Section 11;

Thence, southerly along the west line of Section 13, Township 45 South, Range 37 East, to the Southwest (SW) corner of said Section 13;

Thence, easterly along the south line of said Section 13 to the intersection thereof with the line between Ranges 37 East and 38 East, said point being also the Southeast (SE) corner of said Section 13;

Thence, southerly along said line between said Ranges 37 East and 38 East, being also the west lines of Sections 19, 30 and 31, Township 45 South, Range 38 East, to the intersection thereof with the line between Township 45 South and the Government Lots, said point being also the Southwest (SW) corner of said Section 31;

Thence, easterly along said line between said Township 45 South and the Government Lots, said line being also the south line of said Section 31 and the south line of Section 32, Township 45 South, Range 38 East, to the Southeast (SE) corner of said Section 32;

Thence, southerly along the east line of Government Lot 5, Sections 5 and 8, Township 46 South, Range 38 East, to the Southeast (SE) corner of the North one-half (N1/2) of said Section 8;

Thence, easterly along the south line of the North one-half (N1/2) of Section 9, Township 46 South, Range 38 East, to the Southeast (SE) corner of said North one-half (N1/2) of said Section 9;

Thence, southerly along the west lines of Sections 10, 15, 22, 27 and 34, Township 48 South, Range 38 East, to the intersection thereof with the line between Townships 46 South and 47 South, said point being also the Southwest (SW) corner of said Section 34;

Thence, easterly along said line between said Townships 46 South and 47 South, being also the south line of said Section 34, to the Northeast (NE) corner of Section 4, Township 47 South, Range 38 East;

Thence, southerly along the east line of said Section 4 to the Southeast (SE) corner of said Section 4;

Thence, easterly along the north lines of Sections 10 and 11, Township 47 South, Range 38 East, to the intersection thereof with the center line of the South Florida Water Management District's Levee 6 Right of Way;

Thence, southwesterly along said center line of said Levee 6 Right of Way to the intersection thereof with the center line of the South Florida Water Management District's Levee 5 Right of Way, said intersection point being in Broward County;

Thence, westerly along said center line of said Levee 5 Right of Way, said course being in Broward County, to the intersection thereof with the east line of Section 28, Township 47 South, Range 37 South;

Thence, northerly along said east line of said Section 28 and the east lines of Sections 21 and 16, Township 47 South, Range 37 East, to the Northeast (NE) corner of the South one-half (S1/2) of said Section 16, said point being in Palm Beach County;

Thence, westerly along the north line of said South one-half (S1/2) of said Section 16 to the Northwest (NW) corner of said South one-half (S1/2) of said Section 16;

Thence, northerly along the west line of said Section 16 to the Northwest (NW) corner of said Section 16;

Thence, westerly along the south lines of Sections 8 and 7, Township 47 South, Range 37 East, to the intersection thereof with the line between Ranges 36 East and 37 East, said point being also the Southwest (SW) corner of said Section 7;

Thence, northerly along said line between said Ranges 36 East and 37 East, being also the west line of said Section 7 and the west line of Section 6, Township 47 South, Range 37 East, to the intersection thereof with the line between Townships 46 South and 47 South, said point being also the Northwest (NW) corner of said Section 6;

Thence, westerly along said line between said Townships 46 South and 47 South, said line being also the south line of Section 31, Township 46 South, Range 37 East, to the intersection thereof with the line between Ranges 36 East and 37 East, said point being also the Southwest (SW) corner of said Section 31;

Thence, northerly along said line between said Ranges 36 East and 37 East, being also the west line of said Section 31 and the west lines of Sections 30 and 19, Township 46 South, Range 37 East, to the intersection thereof with the line between Townships 46 South and 47 South, said point being also the Southeast (SE) corner of Section 36, Township 46 South, Range 36 East;

Thence, westerly along said line between said Townships 46 South and 47 South, being also the south line of said Section 36 and the south lines of Sections 35 and 34, Township 46 South, Range 36 East, to the Southwest (SW) corner of said Section 34;

Thence, northerly along the west line of said Section 34 and the west lines of Sections 27 and 22, Township 46 South, Range 36 East, to the Northwest (NW) corner of said Section 22;

Thence, easterly along the north line of said Section 22 to the Southeast (SE) corner of Section 15, Township 46 South, Range 36 East;

Thence, northerly along the east line of said Section 15 and the east line of Section 10, Township 46 South, Range 36 East, to the Northeast (NE) corner of said Section 10;

Thence, westerly along the north line of said Section 10 to the Southwest (SW) corner of Section 3, Township 46 South, Range 36 East;

Thence, northerly along the west line of said Section 3 to the intersection thereof with the line between Townships 45 South and 46 South, said point being the Northwest (NW) corner of said Section 3;

Thence, westerly along said line between said Townships 45 South and 46 South, being also the south lines of Sections 33, 32 and 31, Township 45 South, Range 36 East, to the intersection thereof with the line between Ranges 35 East and 36 East, said point being also the Southwest (SW) corner of said Section 31;

Thence, northerly along said line between said Ranges 35 East and 36 East, being also the west line of said Section 31 and the west lines of Sections 30 and 19, Township 45 South, Range 36 East, to the Northwest (NW) corner of said Section 19;

Thence, easterly along the north line of said Section 19 to the Southeast (SE) corner of Section 18, Township 45 South, Range 36 East;

Thence, northerly along the east line of said Section 18, the east lines of Sections 7 and 6, Township 45 South, Range 36 East, and the east lines of Sections 31, 30, 19 and 18, Township 44 South, Range 36 East, to the intersection thereof with the south Right of Way line of the Florida East Coast Railway, said point lies 94.5 feet south of the Northeast (NE) corner of said Section 18;

Thence, North 89º 57' 00" East (the following bearings and distances are based on the description of Southshore Drainage District) along said south Right of Way line of said Florida East Coast Railway, a distance of 15,915.8 feet to a point, said point being 50 feet east of, and 81.6 feet south of, the Northeast (NE) corner of Section 15, Township 44 South, Range 36 East;

Thence, South 00º 07' 00" West along a line 50 feet east of, and parallel to, the east line of said Section 15, a distance of 2561 feet, more or less, to the intersection thereof with the south line of the North one-half (N1/2) of Section 14, Township 44 South, Range 36 East;

Thence, easterly along said south line of said North one-half (N1/2) of said Section 14 to the intersection thereof with the west Right of Way line of the South Florida Water Management District's North New River Canal;

Thence, northerly along said west Right of Way line of said North New River Canal to the intersection thereof with northeasterly edge of the Old Okeechobee State Levee;

Thence, northwesterly along said northeasterly edge of said Old Okeechobee State Levee to the intersection thereof with the center line of the South Florida Water Management District's Levee Dike 2 Right of Way;

Thence, northeasterly along said center line of said Levee Dike 2 Right of Way to the intersection thereof with the center line of the South Florida Water Management District's Hillsboro Canal Right of Way;

Thence, easterly along said center line of said Hillsboro Canal Right of Way to the intersection thereof with the center line of the South Florida Water Management District's North New River Canal Right of Way;

Thence, southerly along said center line of said North New River Canal Right of Way to the intersection thereof with the south line of Section 2, Township 44 South, Range 36 East;

Thence, easterly along said south line of said Section 2 and the south line of Section 1, Township 44 South, Range 36 East, to the intersection thereof with the center line of the South Florida Conservancy District's Lateral 1-1N Right of Way;

Thence, northeasterly along said center line of said Lateral 1-1N Right of Way to the intersection thereof with the center line of said Hillsboro Canal Right of Way;

Thence, southeasterly along said center line of said Hillsboro Canal Right of Way to the intersection thereof with the center line of State Road 80 Right of Way;

Thence, southwesterly and southerly along said center line of said State Road 80 Right of Way to the intersection thereof with the center line of County Road 827A;

Thence, southerly along said center line of said County Road 827A to the intersection thereof with the north line of Section 17, Township 44 South, Range 37 East;

Thence, easterly along the north line of said Section 17 and the north lines of Sections 16 and 15, Township 44 South, Range 37 East, to the Northeast (NE) corner of said Section 15, and the POINT OF BEGINNING.

S-3 BASIN and S-8 BASIN (Palm Beach and Hendry Counties)

Beginning at the Northeast (NE) corner of Section 19, Township 45 South, Range 36 East, thence, bear westerly along the north line of said Section 19 to the intersection thereof with the line between Ranges 35 East and 36 East, said point being also the Northwest (NW) corner of said Section 19;

Thence, southerly along said line between said Ranges 35 East and 36 East, said line being also the west line of Section 19 and the west lines of Sections 30 and 31, Township 45 South, Range 36 East, to the intersection thereof with the line between Townships 45 South and 46 South, said point being also the Southwest (SW) corner of said Section 31;

Thence, easterly along said line between said Townships 45 South and 46 South, being also the south line of said Section 31 and the south lines of Sections 32 and 33, Township 45 South, Range 36 East, to the Southeast (SE) corner of said Section 33;

Thence, southerly along the east line of Section 4, Township 46 South, Range 36 East, to the Southeast (SE) corner of said Section 4;

Thence, easterly along the south line of Section 3, Township 46 South, Range 36 East, to the Southeast (SE) corner of said Section 3;

Thence, southerly along the east lines of Sections 10 and 15, Township 46 South, Range 36 East, to the Southeast (SE) corner of said Section 15;

Thence, westerly along the south line of said Section 15 to the Northeast (NE) corner of Section 21, Township 46 South, Range 36 East;

Thence, southerly along the east line of said Section 21 and the east lines of Section 28 and 33, Township 46 South, Range 36 East, to the intersection thereof with the line between Townships 46 South and 47 South, said point being also the Southeast (SE) corner of said Section 33;

Thence, westerly along said line between said Townships 46 South and 47 South, being also the south line of said Section 33, the south lines of Sections 32 and 31, Township 46 South, Range 36 East, and the south lines of Sections 36 and 35, Township 46 South, Range 35 East, to the intersection thereof with the center line of South Florida Water Management District's Miami Canal Right of Way;

Thence, southeasterly along said center line of said Miami Canal Right of Way to the intersection thereof with the south line of Section 11, Township 47 South, Range 35 East;

Thence, westerly along the south line of said Section 11 and the south line of Section 10, Township 47 South, Range 35 East, to the Southwest (SW) corner of said Section 10;

Thence, northerly along the west line of said Section 10 to the Northwest (NW) corner of said Section 10;

Thence, easterly along the north line of said Section 10 to the Northeast (NE) corner of said Section 10;

Thence, northerly along the east line of Section 3, Township 47 South, Range 35 East, and the east line of Section 34, Township 46 South, Range 35 East, to the Northeast (NE) corner of said Section 34;

Thence, westerly along the north line of said Section 34 to the Northwest (NW) corner of said Section 34;

Thence, northerly along the west line of Section 27, Township 46 South, Range 35 East, to the Northwest (NW) corner of said Section 27;

Thence, easterly along the north line of said Section 27 to the intersection thereof with said center line of said Miami Canal Right of Way;

Thence, northwesterly along said center line of said Miami Canal Right of Way to the intersection thereof with the north line of Section 22, Township 46 South, Range 35 East;

Thence, westerly along said north line of said Section 22 and the north line of Section 21, Township 46 South, Range 35 East, to the Northwest (NW) corner of said Section 21;

Thence, southerly along the west line of said Section 21 to the Southwest (SW) corner of said Section 21;

Thence, westerly along the south lines of Sections 20 and 19, Township 46 South, Range 35 East, to the intersection thereof with the line between Ranges 34 East and 35 East, said point being also the line between Palm Beach and Hendry Counties;

Thence, southerly along said line between said Ranges 34 East and 35 East, and said line between said Palm Beach and Hendry Counties, to the intersection thereof with the center line of the South Florida Water Management District's Levee 3 Right of Way;

Thence, westerly, northwesterly and northerly along said center line of said Levee 3 Right of Way, said course and the following courses being in Hendry County, to the intersection thereof with the center line of the South Florida Water Management District's Levee 2 Right of Way;

Thence, northerly along said center line of said Levee 2 Right of Way to the intersection thereof with the center line of the South Florida Water Management District's Levee 1 Right of Way;

Thence, northerly along said center line of said Levee 1 Right of Way to the intersection thereof with the center line of the South Florida Water Management District's Levee 1 East Right of Way;

Thence, easterly along said center line of said Levee 1 East Right of Way to the intersection thereof with the east line of Section 10, Township 44 South, Range 34 East;

Thence, northerly along said east line of said Section 10 and the east line of Section 3, Township 44 South, Range 34 East, to the Northwest (NW) corner of the South one-half (S1/2) of Section 2, Township 44 South, Range 34 East;

Thence, easterly along the north line of said South one-half (S1/2) of said Section 2, the north line of the South one-half (S1/2) of Section 1, Township 44 South, Range 34 East, (the following courses are in Palm Beach County), and the north line of the South one-half (S1/2) of Section 6, Township 44 South, Range 35 East, to the intersection thereof with the east/west center line of the Seaboard Coast Line Railroad Right of Way;

Thence, easterly and southeasterly along said east/west center line of said Seaboard Coast Line Railroad Right of Way to the intersection thereof with said center line of said Miami Canal;

Thence, northeasterly and northerly along said center line of said Miami Canal Right of Way to the intersection thereof with the center line of State Road 80 (U.S. 27) Right of Way;

Thence, northeasterly, easterly and southeasterly along said center line of said State Road 80 (U.S. 27) to the intersection thereof with the east line of Section 6, Township 44 South, Range 36 East;

Thence, southerly along said east line of said Section 6, to a point, said point being 75 feet north of the Southeast (SE) corner of said Section 6;

Thence, westerly along a line 75 north of, and parallel to, the south line of said Section 6 to a point, said point being 75 feet north of, and 30 feet east of, the Southwest (SW) corner of said Section 6 (bearing and distances are based on the description of Southshore Drainage District);

Thence, South 45º 00' 00" East, to the intersection thereof with the east line of Section 7, Township 44 South, Range 36 East, said intersection point is 105.8 north of the Southeast (SE) corner of said Section 7;

Thence, southerly along the east line of said Section 7, the east lines of Sections 18, 19, 30 and 31, Township 44 South, Range 36 East, and the east lines of Sections 6, 7 and 18, Township 45 South, Range 36 East, to the Northeast (NE) corner of Section 19, Township 45 South, Range 36 East, and the POINT OF BEGINNING.

Indicated below are the approximate boundaries of the Everglades Construction Project diversion basins for Lake Okeechobee discharges not included in the original regulated acreage of the EAA represented by the base period water quality and flow dataset described in Appendix 3. The Diversion Project drainage areas became regulated under this Chapter upon completion and operation of their associated diversion structures. Upon the effective date of this rule amendment, the original EAA base period water quality and flow data dataset will be adjusted using an acreage adjustment factor to account for these areas as described next. Note that the boundaries and diversion basin acreages described in this Appendix are approximate and may differ from those described in permits issued in accordance with Chapter 40E-63, F.A.C., for which more detailed and accurate drainage information is submitted by permit applicants and approved by the District at the time of permit issuance. Where there are differences, the District will make a determination as to accuracy of the permitted acreage.

CLOSTER FARMS DIVERSION BASIN (Palm Beach County)

Beginning at the intersection of the center line of the LD-2 Levee with the North line of Section 26, Township 42 South, Range 36 East; thence, Southerly along the center line of the LD-2 Levee to the South line of Section 36.

Continue in Township 43 South, Range 36 East:

Thence, continue southerly along the center line of the LD-2 Levee to the north line of Section 12;

Thence, east along the north line of said Section 12 and the north line of Section 7 Township 43S Range 37E, to the east right of way line of State Road 715;

Thence, southerly along said Easterly right of way line of State Road 715 to the centerline of the easterly extension of the existing road on the south side of Paul Rardin County Park;

Thence, easterly along said extension of the existing road to a point in the center line of an existing Levee near the center of Section 7;

Thence, Northerly along the center line of said existing levee through Sections 7, 8 and 5 to the North line of said Section 5.

Continue in Township 42 South, Range 37 East:

Thence, continue along the center line of said existing levee through Sections 31 and 30, to the North line along Section 30;

Thence, Westerly to the Northwest corner of said Section 30.
Continue in Township 42 South, Range 36 East:

Thence, Westerly along the North line of Sections 25 and 26, to the intersection with the center line of LD-2 Levee and the POINT OF BEGINNING.

The above described lines approximate drainage divides, comprising the actual boundary of this basin. The drainage divides were mapped from U.S.G.S. 7 ½ minute quadrangle maps. This basin boundary description is for basin boundary determination only and is not to be used for land conveyances.

EAST BEACH WATER CONTROL DISTRICT DIVERSION BASIN (Palm Beach County)

Beginning at a point on the east beach of Lake Okeechobee in Palm Beach County, Florida, where the section line dividing Section 4 and Section 9, Township 42 South, Range 37 East, intersects the (east right of way boundary line of the Federal Lake Okeechobee Levee);

Thence, in a southwesterly direction along the east right of way boundary of said Federal Levee to a point where the said right of way boundary intersects the section line dividing Section 23 and Section 26, Township 42 South, Range 36 East, (and the South Florida Water Management District levee);

Thence, due east along (the South Florida Water Management District Levee) and the section lines dividing Sections 23 and 26 and Sections 24 and 25, Township 42 South, Range 36 East, to a point of intersection with the east shore of Pelican Bay (being a point of the South Florida Water Management District Levee);

Thence, southerly along the said shore line of Pelican Bay (and the South Florida Water Management District Levee) to a point of intersection with the township line dividing Township 42 South and Township 43 South and (the East Shore Water Control District Levee);

Thence, east along the said Township line (and the levee separating the East Shore Water Control District) to a point being the intersection with the section line dividing Section 32 and Section 33, Township 42 South, Range 37 East (and the Levee separating the East Unit of the Pahokee Water Control District);

Thence, north along (the levee separating the East Unit of the Pahokee Water Control District and) the section lines dividing Sections 32 and 33, Sections 29 and 28, Sections 20 and 21, Sections 17 and 16 and Sections 8 and 9 of Township 42 South, Range 37 East to the POINT OF BEGINNING.

EAST SHORE WATER CONTROL DISTRICT DIVERSION BASIN (Palm Beach County)

Beginning at a point, being in the Center Line of the south boundary levee of the Pahokee Water Control District and being the northeast corner of Township 43 South, Range 37 East;

Thence, running south along the range line and the east boundaries of Sections 1, 12 and 13 to the Southeast corner of said Section 13;

Thence, running west along the south boundaries of Sections 13, 14, 15 and 16 to the Southwest corner of said Section 16, being a point of inter-section with the West boundary levee of Pump Unit No. 6, South Florida Conservancy District;

Thence, running north along the west boundaries of Sections 16 and 9, being the center line of the said South Florida Conservancy District levee, to a point being 100 feet south of the West quarter corner of said Section 9;

Thence, running west along a line 100 feet south of, and parallel to the East and West quarter section line of Sections 8 and 7 to a point being 4,700 feet west of the East boundary of Section 7 and being a point of intersection;

Thence, running northwesterly along a line which bears 52 degrees west to a point being the intersection with the center line of the U.S. Army Corps of Engineers Lake Okeechobee Levee, said point of intersection being 100 feet southwest of the center line of the Federal Levee Culvert No. 12;

Thence, running at right angles along the center line of said Federal Levee a distance of 200 feet, to a point of intersection;

Thence, running at right angles to the center line of said Federal Levee along a line which bears south 52 degrees east to a point of intersection;

Thence, running east along a line 100 feet north of and parallel to, the East and West quarter section line of Sections 7 and 8, to a point being the intersection with the center line of the South Florida Water Management District's Lake shore levee;

Thence, running northerly along the meander line of the said South Florida Water Management District Levee to a point of intersection with the North boundary of Section 5, being the center line of the South boundary levee of the East Beach Water Control District and the Pahokee Water Control District;

Thence, running east along the Township line and the North boundaries of Sections 5, 4, 3, 2, and 1, being the center line of said Pahokee Water Control District to the POINT OF BEGINNING.

SOUTH FLORIDA CONSERVANCY DISTRICT DIVERSION BASIN (Palm Beach and Hendry Counties)

A parcel of land in Sections 13, 14, 23, 24, 25, 26, 35 and 36 Township 43 South, Range 34 East, Sections 19, 30 and 31 Township 43 South, Range 35 East, Sections 1 and 2 Township 44 South, Range 34 East and Section 6 Township 44 South, Range 35 East; said parcel being a portion of the South Florida Conservancy District and particularly described as follows:

Begin at the intersection of the North line of Section 19 Township 43 South, Range 35 East and the Southerly right of way of State Road 80;

Thence, Westerly along the Southerly right of way of State Road 80 to the intersection of old U.S. 27, thence Easterly along the North right of way of State Road S-80A (old U.S. 27) to the intersection of the center line of North-South half section line of Section 13,

Thence, South on said North-South half section line through Sections 13 and 24, to a point 25 feet North of the center of Section 24, Township 43 South, Range 34 East,

Thence, West along a line 25 feet North and parallel to the East-West half section line in Section 24 and 23 to the West line of Section 23.

Thence, South along the West line of Sections 23 and 26, Township 43 South, Range 34 East;
thence West along the North line of Section 34, a distance of 50 feet, thence South along a line 50 feet West of and parallel to the West line of Sections 35 and 2, Township 44 South, Range 34 East, to the half section line of Section 2, Township 44 South, Range 34 East;

Thence, East along the half section line of Sections 2 and 1, Township 44 South, Range 34 East;

Thence, East along the half section line of Section 6 Township 44 South, Range 35 East, which is the common boundary between South Florida Conservancy District and Ritta Drainage District to the East line of said Section 6;

Thence, North along the East line of said Section 6 and the East line of Sections 31, 30 and 19 Township 43 South, Range 35 East to the South right of way line of USED L-D2; Thence Northerly along said South right of way line of USED L-D2 to the north line of said Section 19;
Thence, Westerly along the north line of said section 19 to the intersection with the South line of State Road 80 and the POINT OF BEGINNING.

SOUTH SHORE DRAINAGE DISTRICT DIVERSION BASIN (Palm Beach County)

Commence at point being the intersection of the west right-of-way line of the Everglades Drainage District's North New River Canal with the east and west half section line of Section 14, Township 44 South, Range 36 East;

Thence, west along the aforesaid half section line of Section 14, 3,722 feet, more or less, to a point whence the quarter corner between Section 14 and Section 15, Township 44 South, Range 36 East, bears west 50 feet distant;

Thence, north 0° 7′ east along a line parallel to and 50 feet east of the section line between the aforesaid Section 14 and Section 15, a distance of 2,561 feet, more or less, to a point being the intersection with the South boundary of Florida East Coast Railway right-of-way, said point lying 50 feet east, and 81.6 feet south of the section corner common to Sections 10, 11, 14 and 15, Township 44 South, Range 36 East; said point also being the POINT OF BEGINNING;

Thence, south 89° 57′ west along the south boundary of the Florida East Coast Railway right-of-way, a distance of 15,915.8 feet, more or less, through Sections 15, 16, and 17 to a point on the section line between Sections 17 and 18, said point lying 94.5 feet south of the section corner common to Sections 7, 8, 17, and 18, Township 44 South, Range 36 East;

Thence, north 0° 5′ east along said section line between Sections 17 and 18 and Sections 7 and 8 to a point on the section line between Sections 7 and 8, said point being 105.8 feet north of the section corner common to Sections 7, 8, 17, and 18, Township 44, Range 36 East;

Thence, north 45° 00′ west diagonally through Section 7, Township 44 South, Range 36 East, 7,431 feet, more or less, to a point lying 75 feet north and 30 feet east of the section corner common to Sections 1 and 12, Township 44 South, Range 35 East, and Sections 6 and 7, Township 44 South, Range 36 east (the above-described line being parallel to and 75 feet distant from a true northwest diagonal line through the aforesaid Section 7);

Thence, south 89° 21′ west along a line parallel to and 75 feet north of the section line between Section 1 and Section 12, Township 44 South, Range 35 East, a distance of 5,227 feet, more or less, to a point whence the corner of Sections 1, 2, 11, and 12, Township 44 South, Range 35 East, bears 45° 00′ west 105.8 feet distant;

Thence, continue south 89°21’ west to the north right of way line of said Florida East Coast Railway right of way;

Thence, northwest along said north right of way line of the Florida East Coast Railway to the East right of way line of South Florida Water Management District’s Levee 25;

Thence, northeasterly and northerly along said East right of way line of South Florida Water Management District’s Levee 25 to the north line of State Road 80;

Thence, continue North on the East right of way line of South Florida Water Management District’s Levee 25 to the South right of way line of Federal Levee L-D2;

Thence, East on the South right of way line of said (Federal Levee) L-D2 to the intersection with a line that is 75 feet east of the east line of said Section 2, Township 44 South, Range 35 East;

Thence, along the south boundary of the aforesaid Federal Levee right-of-way, more particularly described as follows:

(a) North 88° 44′ east, a distance of 5,229 feet, more or less, to a point being on the range line between Sections 31 and 36, Township 43 South, Ranges 35 and 36 East;

(b) Thence, north 88° 44′ east, a distance of 2,222 feet, more or less, to a point;

(c) Thence, south 63° 03′ east, a distance of 1,428 feet, more or less, to a point being on the township line between Section 31 and Section 6, Townships 43 and 44 South, Range 36 East;

(d) Thence, south 62° 54′ east, a distance of 2,022 feet, more or less, to a point being on the section line between Section 5 and Section 6, Town-ship 44 South, Range 36 East;

(e) Thence, south 58° 52′ east, a distance of 6,115 feet, more or less, to a point being on the section line between Sections 4 and 5, Township 44 South, Range 36 East;

(f) Thence, south 58° 52′ east, a distance of 1,820 feet, more or less, to a point;

(g) Thence, south 76° 25′ east, a distance of 881 feet, more or less, to a point on the section line between Section 4 and Section 9, Township 44 South, Range 36 East;

(h) Thence, south 76° 25′ east, a distance of 1,904 feet, more or less, to a point;

(i) Thence, south 86° 45′ east, a distance of 1,034 feet, more or less, to a point on the Section line between Section 9 and 10, Township 44 South, Range 36 East;

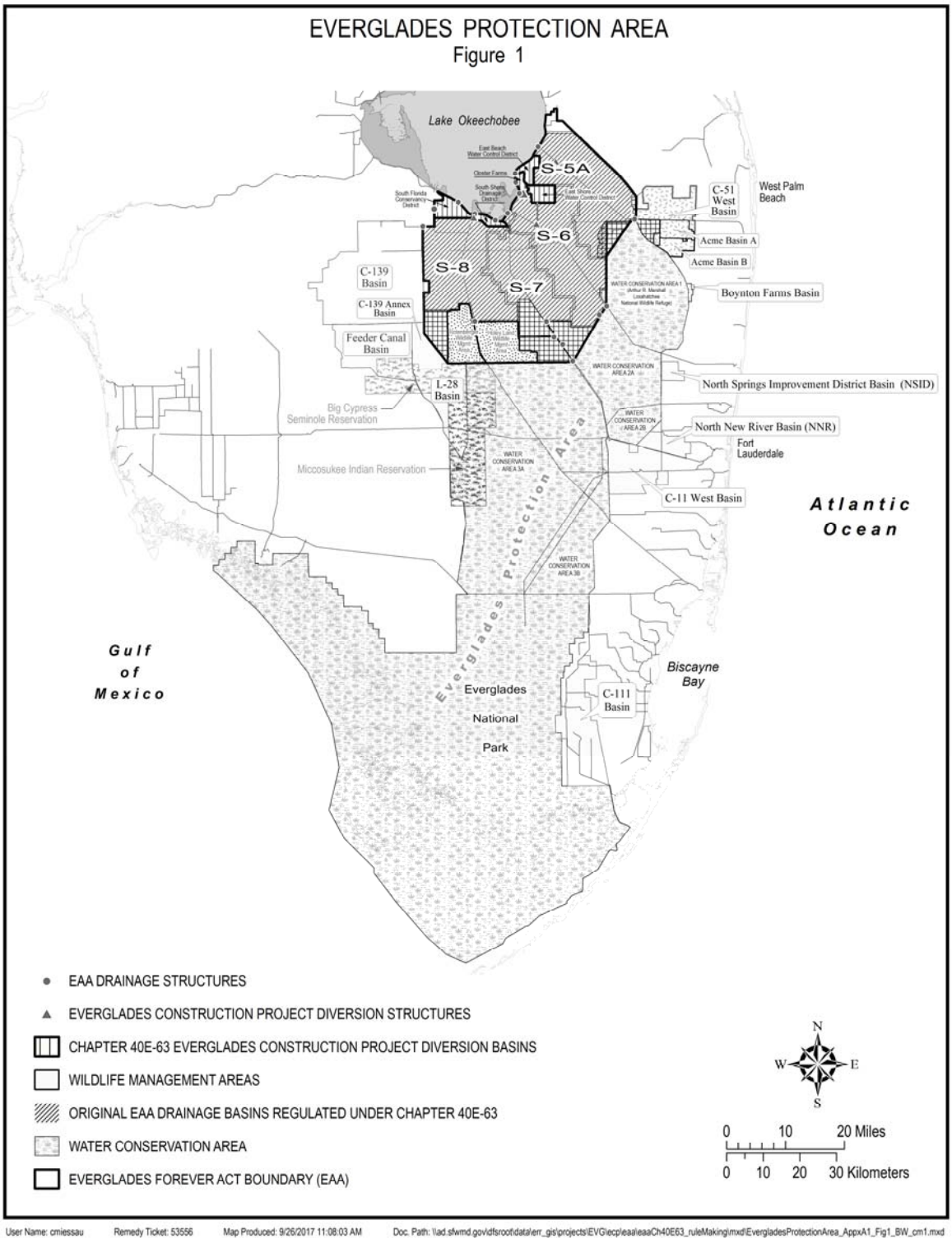
(j) Thence, south 86° 45′ east, a distance of 2,603.3 feet, more or less, to a point, being the intersection of the south boundary of the Federal Levee right-of-way with the South boundary of the Everglades Drainage District's Lake Okeechobee Levee;

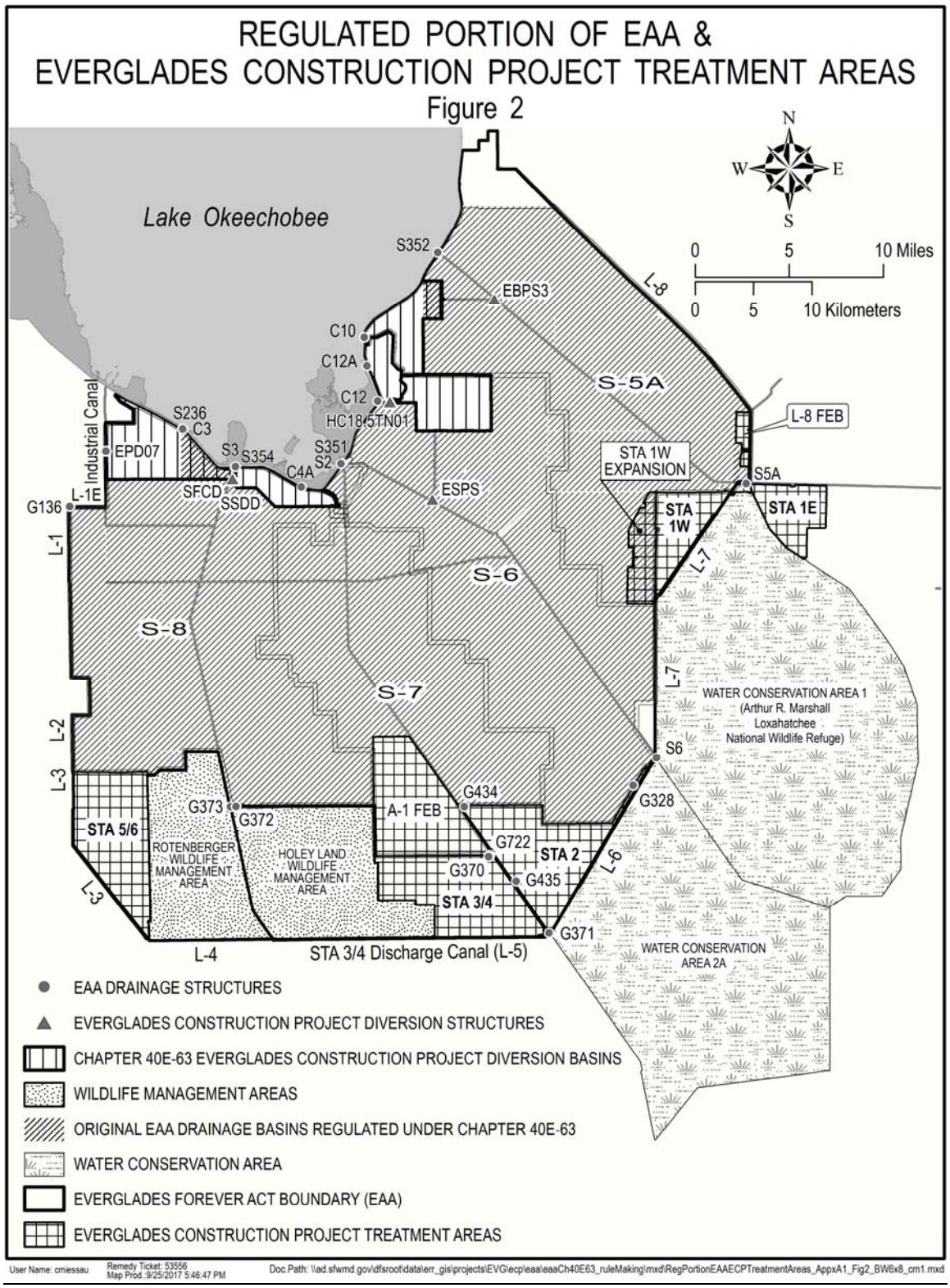
(The above-described boundaries are in common with the South Shore Drainage District Plan of Reclamation dated July 1, 1935)

Thence, south to the north right of way line of state road 80;

Thence, southeasterly along said north right of way line of state road 80 to the said south boundary of the Florida East Coast Railway right of way;

Thence, west along said south boundary of the Florida East Coast Railway right of way to the POINT OF BEGINNING.


EVERGLADES PROTECTION AREA
Figure 1
Lake Okeechobee
S-5A
S-6
S-8
S-7
C-51 West Basin
West Palm Beach
Acme Basin A
Acme Basin B
Boynton Farms Basin
C-139 Basin
C-139 Annex Basin
Feeder Canal Basin
L-28 Basin
Big Cypress Seminole Reservation
Miccosukee Indian Reservation
North Springs Improvement District Basin (NSID)
North New River Basin (NNR)
Fort Lauderdale
C-11 West Basin
Atlantic Ocean
Everglades Protection Area
Gulf of Mexico
Everglades National Park
Biscayne Bay
C-111 Basin
EAA DRAINAGE STRUCTURES
EVERGLADES CONSTRUCTION PROJECT DIVERSION STRUCTURES
CHAPTER 40E-63 EVERGLADES CONSTRUCTION PROJECT DIVERSION BASINS
WILDLIFE MANAGEMENT AREAS
ORIGINAL EAA DRAINAGE BASINS REGULATED UNDER CHAPTER 40E-63
WATER CONSERVATION AREA
EVERGLADES FOREVER ACT BOUNDARY (EAA)
N
W
E
S
0 10 20 Miles
0 10 20 30 Kilometers
User Name: cmiessau Remedy Ticket: 53556 Map Produced: 9/26/2017 11:08:03 AM Doc. Path: \\ad.sfwmd.gov\dfsroot\data\err_gis\projects\EVG\ecp\eaa\eaaCh40E63_ruleMaking\mxd\EvergladesProtectionArea_AppxA1_Fig1_BW_cm1.mxd


REGULATED PORTION OF EAA &
EVERGLADES CONSTRUCTION PROJECT TREATMENT AREAS
Figure 2
N
W
E
S
0 5 10 Miles
0 5 10 Kilometers
Lake Okeechobee
S352
EBPS3
L-8
C10
C12A
C12
HC18.5TN01
S-5A
L-8 FEB
S236
C3
Industrial Canal
EPD07
S3
S354
S351
S2
C4A
STA 1W EXPANSION
S5A
ESPS
SFCD
SSDD
G136
L-1E
STA 1W
STA 1E
L-1
L-7
S-6
S-8
S-7
WATER CONSERVATION AREA 1
(Arthur R. Marshall
Loxahatchee
National Wildlife Refuge)
L-2
L-3
S6
G434
G328
G373
G372
A-1 FEB
STA 5/6
ROTENBERGER WILDLIFE MANAGEMENT AREA
HOLEY LAND WILDLIFE MANAGEMENT AREA
G722
STA 2
L-6
G370
G435
STA 3/4
G371
L-4
STA 3/4 Discharge Canal (L-5)
WATER CONSERVATION AREA 2A
EAA DRAINAGE STRUCTURES
EVERGLADES CONSTRUCTION PROJECT DIVERSION STRUCTURES
CHAPTER 40E-63 EVERGLADES CONSTRUCTION PROJECT DIVERSION BASINS
WILDLIFE MANAGEMENT AREAS
ORIGINAL EAA DRAINAGE BASINS REGULATED UNDER CHAPTER 40E-63
WATER CONSERVATION AREA
EVERGLADES FOREVER ACT BOUNDARY (EAA)
EVERGLADES CONSTRUCTION PROJECT TREATMENT AREAS
User Name: cmiessau
Remedy Ticket: 53556
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APPENDIX A3
EAA BASIN COMPLIANCE

INTRODUCTION

This Appendix sets forth the procedures the District shall ~~will~~ follow ~~in the future~~ to determine whether the entire EAA Basin has met the goal of reducing total phosphorus (TP) discharged by 25 percent, under any set of hydrologic conditions that could arise, after implementation ~~installation~~ of ~~farm-level~~ BMPs as described in Part I of Chapter 40E-63, F.A.C., The first determination was for the period, May 1, 1995 through April 30, 1996, and annually thereafter. The annual determination requires calculation of ~~future~~ TP load leaving the structures from the EAA (locations shown in ~~Figure A4 and listed~~ ~~in~~ Table A1). The load calculation must ~~will~~ ~~also~~ include phosphorus carried into Lake Okeechobee through backpumping ~~when this occurs. It also requires the~~ and adjust~~ment~~ for pass-through flows released from Lake Okeechobee and other sources to Stormwater Treatment Areas, the Holey Land, Water Conservation Areas and the Lower East Coast.

Load is the amount of phosphorus carried past a monitoring point by the movement of water. Data on water quality concentration and water quantity (flow) are required to calculate the phosphorus load discharged from a monitoring point. Data on water quality and quantity at the EAA structures are available from several sources – the District, the U. S. Army Corps of Engineers, and the U.S. Geological Service. Several methods of collecting the data are also used. Accordingly, the best method of data collection and source of data to use in a load calculation must be identified.

The water quality and quantity collection sources and methods currently available are described below. ~~The~~ M~~m~~ethods are improved ~~continuously~~ as new equipment becomes available and technology changes ~~improves.~~ ~~However, existing methods of data collection are continued concurrently with the new methods for a substantial period of time~~. Annually, w~~W~~hen the District reports the results of the determination of whether the EAA Basin has reduced total phosphorus load by 25% for the period of May 1 through ~~-~~ April 30, ~~annually beginning in 1996,~~ the sources and methods of data collection used in the calculation must ~~will~~ be described and available for inspection. Any changes in methods from the prior year must ~~will~~ be specified. Substantially affected persons will have an opportunity to request an administrative hearing. The District shall incorporate permanent changes in methods into this Appendix periodically through Chapter 120, Florida Statutes, rulemaking proceedings.

The load calculations involve detailed procedures, which have been automated by a computer program in FORTRAN language. A flow chart of the program is shown in Figure A3. The methods and equations used in the program are outlined in Appendix A3.1: FORTRAN Program for Calculating EAA Basin Flows and Phosphorus Loads (EAA Basin Compliance model), which is published by reference and incorporated into this Chapter. These methods and equations ~~They~~ are also available electronically ~~on diskette~~.

DATA COLLECTION SOURCES AND METHODS

Water Quantity – Flows~~:~~

The South Florida Water Management District and the U.S. Geological Survey (USGS) compute flow at all the major water control structures in the Everglades Agricultural Area. Water control structures include pumps, gated spillways, and gated culverts. Pump stations S-2, S-3, and S-6 allow water to flow in the opposite direction of pumping by siphoning. All pump stations except S-6 have an adjacent gated spillway.

The SFWMD uses various methods to compute flow at control structures. Flow at pump stations is calculated using discharge rating equations provided by the pump manufacturer and calibrated by discharge measurements. Flow at gated spillways is calculated using formulae derived by the Corps of Engineers from the Bernoulli equation. Discharge through culverts is calculated using standard equations for weir flow, orifice flow, pipe flow, and open channel flow. Flow computation methods are outlined in Appendix A3.2, which is published by reference and incorporated into this Chapter.

The SFWMD obtains field measurements of stage and control operations through various means. Real-time stage and control operations data are collected via the telemetry system. Analog data is obtained from chart recorders. Digital data are provided by punch tapes and solid state data loggers. Pump station operators log readings of stage and control operations hourly during pumping operations. In addition, staff gauge readings, gate opening measurements, and flashboard elevation measurements are conducted by field personnel who routinely visit unmanned structures.

The SFWMD's hydrologic database stores multiple flow data sets at each structure. Each flow data set is created using a unique combination of sources of stage and control operations data. The USGS publishes one set of flow data for each structure. If convenient, the USGS presents combined flow data from different locations. The SFWMD uses the USGS's data as well as its own data to perform water budget analyses and estimation techniques to obtain a "preferred" flow data set at each structure. Table A1 shows all the flow data sets available in the SFWMD's hydrologic database (DBHYDRO).

Water Quality

A water sample collected in the field is called a "raw water sample", in differentiation with a "water sample" used in the chemistry laboratory. Current raw water sample collecting methods at different structures are listed in Table A2. All raw water samples collected in the EAA ~~in the future~~ for compliance must ~~will~~ be collected by automatic sampler. Automatic samplers must ~~will~~ be programmed to take flow proportional composite samples. Where on-site real-time flow computation is impossible, time proportional composite samples will be taken. Grab samples must ~~will~~ also be continued until the relationships between results from automatic and manual methods has been sufficiently established. After that time, grab samples must ~~will~~ be taken when autosamplers are not functioning, or when necessary for other purposes.

Only a portion of a well-mixed raw water sample is used as a water sample in actual quantitative analysis of a given water quality parameter. The chemical analysis is performed by a certified laboratory using accepted standard methods. In case of change of laboratories or analytical methods, concurrent analyses shall be done until correlation between them can be established. Water quality parameters are identified by structure and collection site, project code, sample date, and serial number of the sample. The data are stored in ~~data base WQDMAIN~~ DBHYDRO.

Rainfall

EAA rainfall is calculated from measurements at representative rainfall gauges. Rainfall gauges provide an estimate of rainfall at a "point" location. Since rainfall is expected to vary in intensity and duration over an area, rainfall data from representative gauges are area-weighted using the Thiessen Polygon Method. Nine rainfall gauges have historically been used to estimate EAA rainfall. Daily rainfall data for each rainfall gauge are stored in the DBHYDRO database. The rainfall gauge station names, DBHYDRO identifiers and area-weights corresponding to each rainfall gauge station are listed in Table A3. EAA rainfall for the May 1 through April 30 period is calculated as the area-weighted sum of the daily rainfall measurements at each rainfall gauge.

Data Upgrades

There are three ways in which the quality and reliability of District flow data are being improved: (1) establishment of single time series of flow for each station from multiple sources of stage and control operations data, (2) verification and calibration of flow equations through intensified discharge measurements at all major EAA structures, and (3) calibration of AVM systems for future use as an additional source of flow data.
~~Efforts are currently under way to establish a single time series of flow data calculated at each flow station.~~ A prioritized list of sources of stage and control operations data must ~~will~~ be established for each flow station. Flow must ~~will~~ be computed from the highest ranking sources. When the highest ranking source of data is missing, the next highest source must ~~will~~ be used, and so on. This method ~~will~~ ensures the calculation of the best flow values from all sources and ~~will~~ minimizes missing data.

Stream gauging is being intensified to provide discharge measurements at all major EAA structures. Statistical analyses are conducted ~~under way~~ to verify or calibrate the discharge rating equations. The upgrading of stream gauging equipment, including a portable acoustic low velocity meter, as well as improved measuring techniques ~~will~~ ensures valuable field measurements. Statistical analysis and calibration of rating equations will continue to increase the accuracy of the calculated flow values.

AVM systems are in place at most major EAA structures. Calibration of these systems is being performed by the USGS. When these systems are satisfactorily calibrated, the data are ~~will be~~ used to verify the District's flow computations. If these systems prove to be highly reliable and accurate, they may provide the highest ranking source of flow data for the prioritization of single time series.

If any upgrades in water quality sampling are undertaken in the future, concurrent samples must ~~will~~ be taken by the existing methods to maintain data continuity, at least until the upgraded methods have been tested and documented as reliable.

DETERMINATION OF COMPLIANCE WITH 25% REDUCTION OF TOTAL PHOSPHORUS LOAD

~~The future~~ TP load must ~~will~~ be evaluated for compliance with the 25% TP load reduction requirement yearly as of April 30, a date which corresponds generally with the change from the

dry to the wet rainfall periods. Hydrology, that is, discharge and rainfall, are dominant factors when computing TP loads. Because rainfall and stream flow are subject to large temporal and spatial variation in south Florida, the evaluation for compliance adjusts the TP load for hydrologic variability. Otherwise, the hydrologic variability could be large enough to obscure the effectiveness of BMPs to reduce TP loadings.

The adjustment for hydrologic variability includes two components:

1. A model to estimate future TP loads. The model estimates a future TP load of the EAA Basin by substituting future hydrologic conditions for the conditions that occurred during a base- period (~~water years~~ 1978 - 1988). The estimation is based on hydrologic data collected from a~~ny~~ future time period of May 1 - April 30. The estimation incorporates a calculation for the required 25% TP load reduction.

2. Accommodation for possible statistical error. This ~~in the model~~ is accomplished by specifying a required level of statistical confidence in the prediction of the long-term average TP load. The 90th percentile confidence level is ~~was~~ selected as reasonable.

Evaluation of the EAA Basin for compliance with the 25% TP load reduction requirement must ~~will~~ be based upon the following:

1. If the actual measured TP loading from the EAA Basin (Actual TP Loading) in a future May 1 – April 30 period is less than the model TP load estimate (Target TP Loading), then the EAA Basin will be determined to be "In Compliance," that is, to have met the 25% TP load reduction requirement. After completion of the STAs or other regional projects, the actual percentage of the base period TP load which must be met to be determined "In Compliance" must ~~will~~ be reduced to reflect land converted to STAs or regional projects no longer using the Works of the District within the EAA ~~taken out of agricultural production~~. However, the average unit area reduction required will be the same, both pre- and post-regional project ~~STA~~ completion.

2. If the Actual TP Loading ~~actual measured TP loading~~ from the EAA Basin exceeds the model TP load estimate (Target) in 3 or more consecutive May 1 – April 30 periods, then the EAA Basin will be determined to be "Not In Compliance" – that is, it will not have met the 25% load reduction requirement. If the Target is exceeded in a May 1 – April 30 period, and the District determines that the adjusted rainfall for the period exceeds 63.76 inches, the Target will be suspended for the EAA Basin will not be determined to be "Not In Compliance" for that period only. Any periods in which the Target is suspended must ~~will~~ be excluded from the determination of whether the Target has been exceeded in 3 or more consecutive May 1 – April 30 periods, that is, the EAA Basin will be determined to be "Not In Compliance" when the Target is exceeded for 3 May 1 – April 30 periods, without an intervening May 1 – April 30 period in which the EAA Basin has been determined to be "In Compliance," even though the three periods may be interrupted by periods of suspension.

3. If the Actual TP Loading ~~actual measured TP loading~~ from the EAA Basin exceeds the "upper 90% confidence limit of the Target" (Limit), in any May 1-April 30 period, the EAA Basin will be determined to be "Not in Compliance," that is, it will not have met the 25% load reduction requirement. If the Limit is exceeded in a May 1 – April 30 period, and the District determines that the adjusted rainfall for the period exceeds 63.76 inches, the Limit must

~~will~~ be suspended and the EAA Basin will not be determined to be "Not In Compliance" for that period only.

4. A determination of suspension under paragraphs 2 and 3 above determined, and a Notice of Rights to petition for a hearing under Section 120.57, Florida Statutes, and Section 373.114, Florida Statutes, shall be published in the Florida Administrative Weekly.

5. The Target and Limit must ~~will~~ be calculated according to the following equations and explanation:

To reflect the required 25% reduction, POR TP loads are multiplied by 0.75 before performing the following regression:

$$1n(L) = -7.998 + 2.868\ X + 3.020\ C - 0.3355\ S$$

[Explained Variance = 90.8%, Standard Error of Estimate = .183]

Predictors (X, C, S) are calculated from the first three moments (m_1,m_2,m_3) of the 12 monthly rainfall totals (r_i, i=1,12, inches) for the current year:

$$m_1 = \text{Sum}\ [\ r_i\ ] / 12$$

$$m_2 = \text{Sum}\ [\ r_i - m_1\ ]^2 / 12$$

$$m_3 = \text{Sum}\ [\ r_i - m_1\ ]^3 / 12$$

$$X = 1n\ (12\ m_1)$$

$$C = [\ (12/11)\ m_2]^{.5}/m_1$$

$$S = (12/11)\ m_3 / m_2^{\ 1.5}$$

where,

L = 12-month load attributed to EAA Runoff, reduced by 25% (metric tons)

X = natural logarithm of 12-month total rainfall (inches)

C = coefficient of variation calculated from 12 monthly rainfall totals

S = skewness coefficient calculated from 12 monthly rainfall totals

The first predictor (X) indicates that load increases approximately with the cube of total annual rainfall. The second and third predictors (C & S) indicate that the load resulting from a given annual rainfall is higher when the distribution of monthly rainfall has higher variance or lower skewness. For a given annual rainfall, the lowest load occurs when rainfall is evenly distributed across months and the highest load occurs when all of the rain falls in one month. Real cases fall in between.

Compliance must ~~will~~ be tracked by comparing the measured EAA Load with:

Target = $\exp [-7.998 + 2.868 X + 3.020 C - 0.3355 S]$

Limit = Target $\exp (1.476 SE F)$

SE = $.1833 [1 + 1/9 + 5.125 (X-X_m)^2 + 17.613 (C-C_m)^2 + 0.5309 (S-S_m)^2 + 8.439 (X-X_m) (C-C_m) - 1.284 (X-X_m) (S-S_m) - 3.058 (C-C_m) (S-S_m)]^{.5}$

where,

$_m$ = subscript denoting average value of predictor in base period ($X_m = 3.866$, $C_m = 0.7205$, $S_m = 0.7339$)

Target = predicted load for future rainfall conditions (metric tons/yr)

Limit = upper 90% confidence limit for Target (metric tons/yr)

SE = standard error of predicted 1n(L) for May-April interval

F = factor to reflect variations in model standard error as a function of month (last in 12-month interval), calculated from base period:

Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
F:	1.975	1.609	1.346	1.000	1.440	1.238	1.321	2.045	2.669	2.474	2.420	2.216

Figure A3

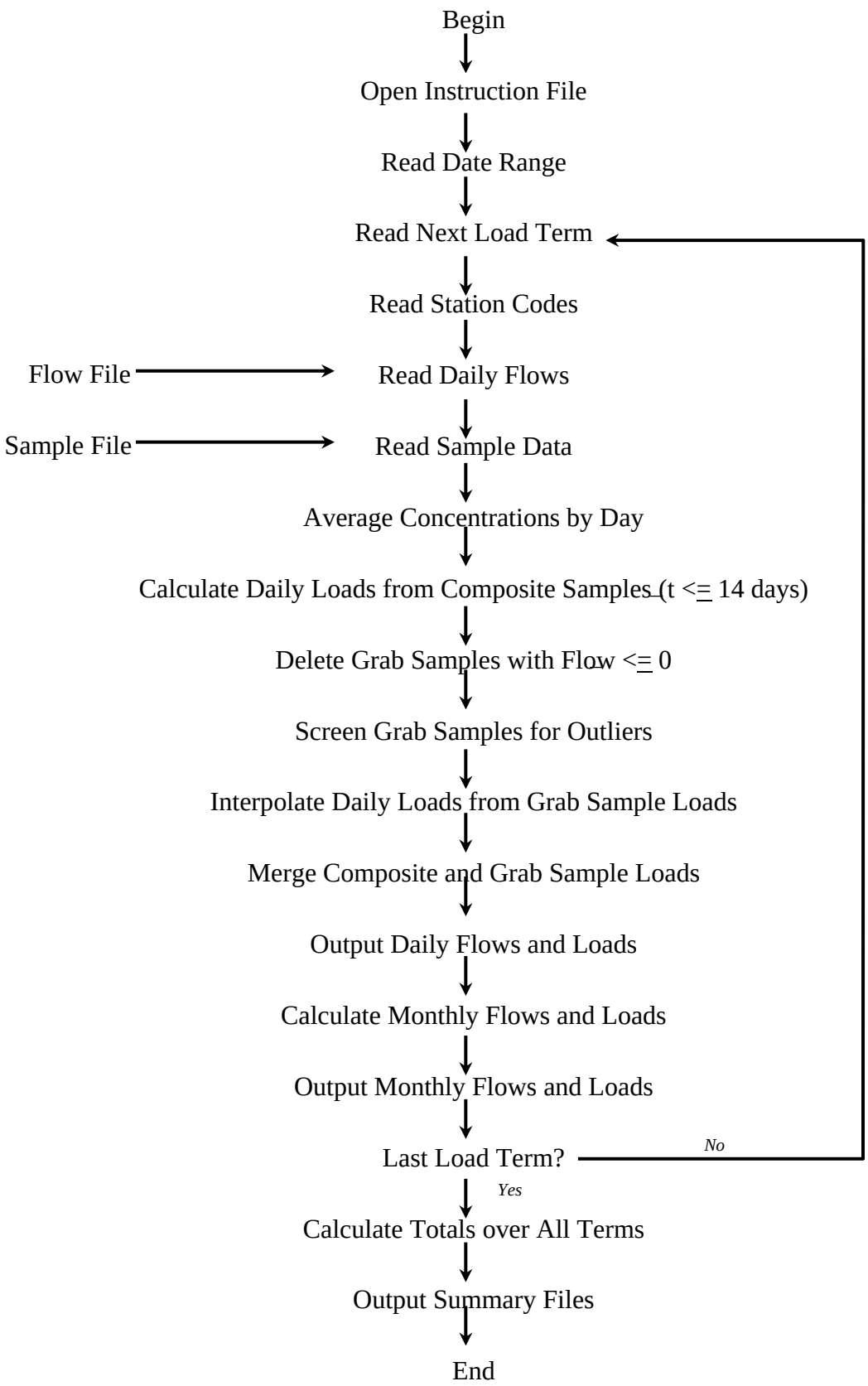
Begin
Open Instruction File
Read Date Range
Read Next Load Term
Read Station Codes
Flow File
Read Daily Flows
Sample File
Read Sample Data
Average Concentrations by Day
Calculate Daily Loads from Composite Samples (t <= 14 days)
Delete Grab Samples with Flow <= 0
Screen Grab Samples for Outliers
Interpolate Daily Loads from Grab Sample Loads
Merge Composite and Grab Sample Loads
Output Daily Flows and Loads
Calculate Monthly Flows and Loads
Output Monthly Flows and Loads
Last Load Term?
No
Yes
Calculate Totals over All Terms
Output Summary Files
End

TABLE A1
EAA BASIN DRAINAGE STRUCTURES
DATABASE KEYS TO FLOW DATA TIME SERIES

Structure	Preferred[1]	Effective Date[2]	Inactive Date[3] (if applicable)
S-352 Complex	15068	Base Period	
S-2 Complex	15021	Base Period	
S-3 Complex	15018	Base Period	
S-5A Complex	15031	Base Period	
S-6	15034	Base Period	
S-7	15037	Base Period	01/08/2005
S-150	15041	Base Period	01/08/2005
S-8	15040	Base Period	01/08/2005
G-88	15196	Base Period	06/30/2000
G-136	15195	Base Period	
G-200	15736	10/28/1991	01/08/2005
G-250	16222	01/25/1994	07/10/1999

Structure	Preferred[1]	Effective Date[2]	Inactive Date[3] (if applicable)
G-600	GG955	03/06/1997	04/30/2005
G-605	H3143	11/24/1997	06/30/2000
G-606	HD889	11/24/1997	06/30/2000
G-328	J0718	04/01/2000	
G-344A	J0719	10/01/1999	07/22/2005
G-344B	J0720	10/01/1999	07/22/2005
G-344C	J0721	10/01/1999	07/22/2005
G-344D	J0722	10/01/1999	07/22/2005
G-349B	JA353	10/01/1999	07/22/2005
G-350B	JA352	10/01/1999	07/22/2005
G-410	LX270	07/17/2001	07/22/2005
G-402A	LX264	07/17/2001	01/08/2005
G-402B	LX265	07/17/2001	01/08/2005
G-402C	LX266	07/17/2001	01/08/2005
G-402D	LX267	07/17/2001	03/30/2004
G-404	LX269	05/06/2000	01/08/2005
EBPS[4]	LX274	07/01/2001	04/30/2018
ESPS[4]	LX273	12/20/2001	04/30/2018
G-357	LX263	03/01/2001	01/08/2005
G-204	SG578	05/01/2003	01/08/2005
G-205	SG579	05/01/2003	01/08/2005
G-206	SG580	05/01/2003	01/08/2005
G-507	SJ382	12/01/2003	07/22/2005
G-370	TA438	10/01/2003	
G-372	TA437	10/01/2003	
G-376A	TA445	02/27/2004	01/08/2005
G-376D	TA446	02/27/2004	01/08/2005
G-379A	TA449	09/17/2004	01/08/2005
G-379D	TA450	09/17/2004	01/08/2005
G-381A	TA447	06/09/2004	01/08/2005
G-381C	TA448	06/09/2004	01/08/2005
SSDD[4]	TA459	06/01/2004	04/30/2018
SFCD[4]	TR998	08/01/2005	04/30/2018

Structure	Preferred[1]	Effective Date[2]	Inactive Date[3] (if applicable)
G-371	TS261	02/01/2006	
G-373	TS260	02/15/2006	
G-373BC	TS262	06/01/2005	07/21/2005
G-434	90327	11/01/2012	
G-435	90328	05/17/2013	
G-722	AM015	08/28/2015	
C-10[4]	15645	05/01/2018	
C-12A[4]	15647	05/01/2018	
C-12[4]	15646	05/01/2018	
C-4A[4]	15648	05/01/2018	
S236[4]	15644	05/01/2018	
EPD07[4]	AM706	05/01/2018	

~~n New, flow data time series for the Holey Land pump station begins on November 25, 1991~~

[1]The reference numbers in the table are keys to the data sets, known as "dbkeys".
[2] The term “Base period” indicates that the structure was part of the EAA model boundary from October 1, 1978, through September 30, 1988. The format is Month – Day – Year.
[3]A date is indicated for those structures that are inactive as of the date of this amendment. The format is Month – Day – Year.
[4]These structures serve the Everglades Construction Project diversion basins for Lake Okeechobee discharges not included in the original regulated acreage of the EAA represented by the base period water quality and flow dataset described in Appendix 3. The Diversion Project drainage areas became regulated under this Chapter upon completion and operation of their associated diversion structures. Upon the effective date of this rule amendment, the original EAA base period water quality and flow data dataset will be adjusted using an acreage adjustment factor to account for these areas.

TABLE A2
EAA BASIN
~~CURRENT~~ WATER QUALITY SAMPLING METHODS

Structure	Collection Site	Instrument[1]	Effective Date[2]	Inactive Date (if applicable)[3]
S-352	GRAVITY	G	Base Period	
S-2	PUMP	A	Base Period	
	GRAVITY	G	Base Period	
S-3	PUMP	A	Base Period	
	GRAVITY	G	Base Period	
S-5A Complex	PUMP	A	Base Period	
	GRAVITY	G		
S-6	PUMP	A	Base Period	01/08/2005
	GRAVITY	G		
S-7	PUMP	A	Base Period	01/08/2005
	GRAVITY	G		
S-150	GRAVITY	G	Base Period	01/08/2005
S-8	PUMP	A	Base Period	06/30/2000
	GRAVITY	G		
G-88	GRAVITY	G	Base Period	
G-136	GRAVITY	A	10/28/1991	01/08/2005
G-200A	GRAVITY	G	01/25/1994	07/10/1999
G-250	PUMP	A	03/06/1997	04/30/2005

Structure	Collection Site	Instrument[1]	Effective Date[2]	Inactive Date (if applicable)[3]
G-600	PUMP	A	11/24/1997	06/30/2000
G-606	GRAVITY	A	11/24/1997	06/30/2000
G-328	PUMP	A	04/01/2000	
G-344A	GRAVITY	A	10/01/1999	07/22/2005
G-344B	GRAVITY	A	10/01/1999	07/22/2005
G-344C	GRAVITY	A	10/01/1999	07/22/2005
G-344D	GRAVITY	A	10/01/1999	07/22/2005
G-349B	PUMP	A	10/01/1999	07/22/2005
G-350B	PUMP	A	10/01/1999	07/22/2005
G-410	PUMP	A	07/17/2001	07/22/2005
G-402A	GRAVITY	GA	07/17/2001	01/08/2005
G-402B	GRAVITY	GA	07/17/2001	01/08/2005
G-402C	GRAVITY	GA	07/17/2001	01/08/2005
G-402D	GRAVITY	GA	07/17/2001	03/30/2004
G-404	PUMP	A	05/06/2000	01/08/2005
EBPS[4]	PUMP	A	07/01/2001	04/30/2018
ESPS[4]	PUMP	A	12/20/2001	04/30/2018
G-357	GRAVITY	A	03/01/2001	01/08/2005
G-204	GRAVITY	G	05/01/2003	01/08/2005
G-205	GRAVITY	G	05/01/2003	01/08/2005
G-206	GRAVITY	G	05/01/2003	01/08/2005
G-507	PUMP	A	12/01/2003	07/22/2005
G-370	PUMP	A	10/01/2003	
G-372	PUMP	A	10/01/2003	
G-376A	GRAVITY	A	02/27/2004	01/08/2005
G-376D	GRAVITY	A	02/27/2004	01/08/2005
G-379A	GRAVITY	A	09/17/2004	01/08/2005
G-379D	GRAVITY	A	09/17/2004	01/08/2005
G-381A	GRAVITY	G	06/09/2004	01/08/2005
G-381C	GRAVITY	G	06/09/2004	01/08/2005
SSDD[4]	PUMP	A	06/01/2004	04/30/2018
SFCD[4]	PUMP	A	08/01/2005	04/30/2018
G-371	GRAVITY	G	02/01/2006	
G-373	GRAVITY	G	02/15/2006	
G-373_BC	GRAVITY	G	06/01/2005	07/21/2005
G-434	PUMP	A	11/01/2012	

Structure	Collection Site	Instrument[1]	Effective Date[2]	Inactive Date (if applicable)[3]
G-435	PUMP	A	05/17/2013	
G-722	GRAVITY	A	08/28/2015	
CULV10[4]	PUMP	G	05/01/2018	
CULV12A[4]	PUMP	G	05/01/2018	
CULV12[4]	PUMP	G	05/01/2018	
CULV4A[4]	PUMP	G	05/01/2018	
S236[4]	PUMP	G	05/01/2018	
EPD07[4]	PUMP	G	05/01/2018	

[1]G = grab sample primary method
A = automatic sampler primary method, grab sample back-up

[2] The term "Base period" indicates that the structure was part of the EAA model boundary from October 1, 1978, through September 30, 1988. The format is Month – Day – Year.

[3]A date is indicated for those structures that are inactive as of the date of this amendment. The format is Month – Day – Year.

[4]These structures serve the Everglades Construction Project diversion basins for Lake Okeechobee discharges not included in the original regulated acreage of the EAA represented by the base period water quality and flow dataset described in Appendix 3. The Diversion Project drainage areas became regulated under this Chapter upon completion and operation of their associated diversion structures. Upon the effective date of this rule amendment, the original EAA base period water quality and flow data dataset will be adjusted using an acreage adjustment factor to account for these areas.

TABLE A3
EAA BASIN
RAINFALL STATIONS

Identifier[1]	Station	Theissen Weight
15197	ALICO_R	0.0974
15198	MIAMI LO_R	0.1076
15199	SOUTH BA_R	0.0844
15200	BELLE GL_R	0.1617
15201	PAHOKEE1_R	0.1438
15202	S5A_R	0.0989
15203	S6_R	0.0763
15204	S7_R	0.0592
15205	S8_R	0.1743

[1]The identifiers are also referred to as "dbkeys".

APPENDIX A3.1
FORTRAN PROGRAM FOR CALCULATING EAA BASIN FLOWS AND PHOSPHORUS LOADS

```
program eaatpld
c modified August, 2000 for various ECP elements
c modified may 1999 for STA-5 inflows from Miami Canal (G350B, G349B)
c modified october 1998 for STA-5 & STA-2
c modified march 1998 for STA-6
c utilizes all composite samples
c compute eaa tp load  10-96 - additional comments added  10-3-96
c useage:g
c         >eaatpld eaa.job
c eaa.job = input ascii file specifying case conditions
c subroutines in subr.for
c maximum dimensions
c number of days = 20000 12000 = 52 32 + years  ~(1978-203010)
c number of grab samples = 4000 2000 per station
c number of composite samples = 4000 2000 per station

c array dimensions increased to handle maximum of 7040 terms
      integer*4 dgrab,dcomp,dlast,dbase,dbase0,d0
      character*64 title
      character*32 ofile1,ofile2,ofile3,ofile4,cfile,qfile,ofile0
      character*32 ofile5
      character*32 blank /' '/
      character*8 slab,dum8,qlab,ulab,usave(70 40),mname(4)
      common /a/ flowu(20000 12000),wcomp(20000 12000),wuse(20000 12000),wusec(20000
12000)
      common /b/ wgrab(20000 12000)
      common /d/ dgrab(4000 2000),dcomp(4000 2000),cgrab(4000 2000),ccomp(4000 2000),
     & x(4000 2000),iym(700 400),qsave(700,70 400,40),wsave(700,70 400,40),isgn(70 40),
     & wcsave(700,70 400,40),sumd(6),sumw(6),y(4000 2000),prb(4000 2000),ratio(2),
     & wc(2),wg(2),ncg(2)
character*32 confile

c array definitions
c    flowu()  = daily flow
c    wgrab()  = daily load computed from grab samples
c    wcomp()  = daily load computed from composite samples
c    wuse()   = daily load used in final result
c    wusec()  = daily load computed from composite samples
c    cgrab()  = grab-sample concentration
c    dgrab()  = grab-sample date
c    ccomp()  = composite sample concentration
c    dcomp()  = composite sample date
c    qsave,wsave,wcsave(month,station)
c             = storage of monthly flow, load, & composite load

c number of load calc methods
      data nmeth/3/
```

```
      data mname/'noflow','compos','  grab','  miss' /

c qfac: convert cfs*days to output units = cfs-days
      data qfac/1./

c scale factor to convert input sample concs (ppm) to (ppb)
      data sf/1000./

c factor: convert cfs*ppb to kg/day; sig: level of outliers
c     factor=24.*3600.*(0.3048**3)/1.e6
      factor=24.*3600/3.28**3/1.e6

c grab/composite ratio
c iratio = 0 compute r1 & r2 separately (original algorithm)
c iratio = 1 set r2 = r1
      data iratio/0/

c read input file [eaa.job] to get station labels and input parameters
      open(7,file=' ',status="old")

c read control parameters
      read(7,*) title,qfile,dum8,cfile,dum8,
     &nmaxc,dum8,dbase0,dum8,dbase,dum8,sig,dum8

c title = problem title
c qfile = input daily flow file
c cfile = input sample concentration file
c nmaxc = maximum duration of composite samples
c dbase0 = first day of base period yyyymmdd = 19781001
c dbase  = last day of base period yyyymmdd = 19910930
c sig = significance level for outlier screening in base period

cc
cc March 98 Modification - Look for Composite Samples NAFTER days beyond last flow date
cc
      nafter = nmaxc
cc
cc end of modification
cc

c read date range
      read(7,*) iymd1,dum8,iymd2,dum8,idchk,dum8
      write(*,*) 'sample date range =',iymd1,iymd2
      read(7,*) ofile0,dum8,ofile5,dum8,ofile1,dum8,ofile2,dum8,
     &    ofile3,dum8,ofile4,dum8
c output files (* = optional)
c ofile0 - sample inventory
c ofile5 - totals by term & time period (base pd & after)
c *ofile1 - daily results
c *ofile2 - monthly results for each term
c *ofile3 - monthly crosstab   (term x month)
c ofile4 - monthly totals (sum of all terms)
```

```
c
      read(7,*)

c jdatei()  converts yyyymmdd to julian dates (days from Jan 1, 1900)
      jdbase=jdatei(dbase)
      jymd1=jdatei(iymd1)
      jymd2=jdatei(iymd2)
      jdchk=jdatei(idchk)
      d0=jymd1-1

c open output file for sample statistics
      open(17,file=ofile0)
      write(17,171) idchk
 171      format( 'QLEFT = FLOW (CFSD) BETWEEN LAST GRAB',
     &    ' SAMPLE DATE WITH POSITIVE FLOW &'
     &    i9,' NOT COVERED BY COMPOSITE SAMPLE'/
     &    '              COMPOSITE SAMPLES        GRAB SAMPLES'/
     &    'STATION       N   DFIRST    DLAST',
     &    ' NTOT NOUT NUSE   DFIRST    DLAST',
     &    '  RATIO1  RATIO2    QLEFT')

c open input flow file
      open (8, file=qfile,status='old')

c open daily output file
      if(ofile1.ne.blank) then
          open(10,file=ofile1,status="unknown")
          write(10,"(a64)") title
          write(10,  2)
      endif
   2          format('station   date   ip mth     flow',
     &        '     load   cgrab   ccomp   cused c/g ratio')

c open monthly output file
      if(ofile2.ne.blank) then
          open(11,file=ofile2,status="unknown")
          write(11,*) title
          write(11,*)
     &         'station  mnth  days flow(csd)  load(kg) conc(ppb)
     &         compos(kg)'
      endif

c nsta = number of stations (terms)
      nsta=0

c *********** for each station (term) in job file *************
   10 nsta=nsta+1

      read(7,*,end=500) ulab,slab,qlab,ipos,icomp,isgn(nsta)
c ulab = output label for mass-balance term
c slab = sample station code
c qlab = flow station code
```

```
c ipos = flow sign indicator (1 = use positive flows, -1 = use negative flows)
c icomp = composite sample indicator
c     0 = ignore composite samples
c     1 = use composite samples
c     2 = use comp. samples, force comp./grab ratio = 1.0 (option not used)
c isgn = sign of term in computing total outflow volume and load
c        1 = outflow term from EAA
c        0 = ignore term
c       -1 = inflow or thruflow term

c capitalize labels
      CALL CONCAP(SLAB,8)
      CALL CONCAP(QLAB,8)
      CALL CONCAP(ULAB,8)
      write(*,*)
      write(*,*) 'term = ',ulab
      write(*,*) 'sample station = ',slab
      write(*,*) 'flow label = ',qlab
      usave(nsta)=ulab

c *********** read daily flows for current station ***********

      call flowread(8,jymd1, jymd2,qlab,nq,flowu)
c file start date must be <= jymd1
c jymd2 is adjusted to reflect end of file
c flow data set should contain no missing values

      if(nq.le.0) go to 999
      write(*,*) 'flow dates =',kdate(jymd1),kdate(jymd2)

c ********** load sample data ***********

      ngrab=0
      ncomp=0

c fixed format input
      open(16,file=cfile,status="old")
      do i=1,4
          read(16,*)
      enddo

c read next sample
 40   read(16,41,end=60) dum8,dd,tt,conc
 41        format(a8,2x,10f10.0)
      itype=jfix(tt)

c convert yymmdd to days from Jan 1, 1900
      idd=dd
      jdd=jdate(dd)

c check stations
      CALL CONCAP(DUM8,8)
```

```
      if(dum8 .ne. slab) go to 40

c check date

cc modified march 1998
cc
cc    if(jdd.lt.jymd1.or.jdd.gt.jymd2) go to 40
cc
      if(jdd.lt.jymd1.or.jdd.gt.jymd2+nafter) go to 40
cc
cc end of modification
cc
c check for valid sample value
      if(conc.eq.0.) go to 40

c rescale concentration and set to absolute value (negative values < detection limit)
      conc=sf*abs(conc)

c check for composite vs. grab sample
c sample dates must be in increasing order
      if(itype.eq.7.or.itype.eq.24) then
c process composite sample
          ncomp=ncomp+1
          ccomp(ncomp)=conc
          dcomp(ncomp)=jdd
          if(ncomp.gt.1.and.dcomp(ncomp).lt.dcomp(ncomp-1)) then
              write(*,*) 'compos sample out of sequence: ',idd
              stop
          endif
      else
c process grab sample
          ngrab=ngrab+1
          cgrab(ngrab)=conc
          dgrab(ngrab)=jdd
          if(ngrab.gt.1.and.dgrab(ngrab).lt.dgrab(ngrab-1)) then
              write(*,*) 'sample date out of sequence: ',idd
              stop
          endif
      endif

      go to 40

c end of sample file
   60 continue
      if(ngrab.gt.0) write(*,*) 'grab samples =     ',ngrab,
     &               kdate(dgrab(1)),kdate(dgrab(ngrab))
      if(ncomp.gt.0) write(*,*) 'composite samples =',ncomp,
     &               kdate(dcomp(1)),kdate(dcomp(ncomp))
      close(16)

c calculate average concentrations by date
      call xred(dgrab,cgrab,ngrab)
```

```
      call xred(dcomp,ccomp,ncomp)
      write(*,*) 'daily-avg grab samples =     ',ngrab
      write(*,*) 'daily-avg composite samples =',ncomp

c scratch composite samples if switch indicates so
      if(icomp.le.0) ncomp=0

c assign daily flows in cfs
      do 70 j=1,nq
          if(ipos.eq.1) then
              flowu(j)=amax1(flowu(j),0.)
          else
              flowu(j)=abs(amin1(flowu(j),0.))
          endif
          wgrab(j)=0.
          wcomp(j)=0.
   70     wuse(j)=0.

c calculate loads from composite samples
      dlast=0.
      do i=1,ncomp

c date range to apply composite-sample concentration
          j2=dcomp(i)-d0
          j1=max0(1,j2-nmaxc)
          if(j1.le.dlast) j1=dlast+1
          if(j1.gt.j2) j1=j2
          do j=j1,j2
              wcomp(j)=flowu(j)*ccomp(i)*factor
          enddo
          dlast=j2
      enddo

c eliminate grab-samples collected on days with no flow
      mgrab=0
      do i=1,ngrab
          if(flowu(dgrab(i)-d0).gt.0.) then
              mgrab=mgrab+1
              dgrab(mgrab)=dgrab(i)
              cgrab(mgrab)=cgrab(i)
          endif
      enddo
      ngrabt=ngrab
      ngrab=mgrab
      write(*,*) 'grab samples on days with positive flow =',ngrab
      if(ngrab.gt.0) write(*,*) 'date range =',kdate(dgrab(1)),
     &               kdate(dgrab(ngrab))

c screen base-period  grab samples for outliers
c based upon log(c) vs. log(q) regression
c (Snedecor & Cochran, Statistical Methods, 1980, pp. 167-168)
      if(sig.gt.0.) then
```

```
          ngt=ngrab
  110     j=0
          do i=1,ngrab
              prb(i)=1.
              if(dgrab(i).le.jdbase) then
                  j=j+1
                  x(j)=alog(flowu(dgrab(i)-d0))
                  y(j)=alog(cgrab(i))
              endif
          end do
          call outlyr(x,y,j,sig,prb,nrej)
          if(nrej.gt.0) then
              m=0
              do 150 i=1,ngrab
              if(prb(i).gt.sig) then
                  m=m+1
                  dgrab(m)=dgrab(i)
                  cgrab(m)=cgrab(i)
              else
                  write(*,140) kdate(dgrab(i)),cgrab(i),prb(i)
  140                 format(' ***outlier: date =',i9,
     &                       ',  conc = ', f10.1, ',  prob =',f8.3)
              endif
  150         continue
              ngrab=m
c repeat screen until no outliers are found
              go to 110
          endif
              ngout=ngt-ngrab
      endif

c calculate daily loads from grab samples by interpolation
      do  i=1,ngrab
          x(i)=dgrab(i)-d0
      enddo
      call eint3(ngrab,x,cgrab,nq,wgrab)

cc end of mod
      do i=1,nq
          wgrab(i)=wgrab(i)*flowu(i)*factor
      enddo

c ratio = load computed from composite samples / load computed from grab samples
c calculate load ratio for days with both composite and grab samples
c calc separate ratios for base period (ratio(1)) and after (ratio(2))
      do i=1,2
          wg(i)=0.
          wc(i)=0.
          ncg(i)=0
      end do
      do 220 i=1,nq
          if(wgrab(i).gt.0.and.wcomp(i).gt.0.) then
```

```
              if(i+d0.gt.jdbase) then
                  j=2
              else
                  j=1
              endif
              wg(j)=wg(j)+wgrab(i)
              wc(j)=wc(j)+wcomp(i)
              ncg(j)=ncg(j)+1
          endif
  220     continue
      do j=1,2
          ratio(j)=ratv(wc(j),wg(j))
c set to 1 if composite samples are ignored
c or if icomp=2
          if(icomp.le.0.or.icomp.eq.2) ratio(j)=1.
      end do
c if missing, set ratio(2)=ratio(1)
      if(ratio(2).le.0.) ratio(2)=ratio(1)

c sample inventory
      if(ncomp.le.0) then
          jc1=0
          jc2=0
      else
          jc1=dcomp(1)
          jc2=dcomp(ncomp)
      endif
      if(ngrab.le.0) then
          jg1=0
          jg2=0
      else
          jg1=dgrab(1)
          jg2=dgrab(ngrab)
      endif
c qdang = total flow between last grab sample date used and last flow date
      qdang=0.

c final load
c sumd = total days
c sumw = total load
c lq = 1 no flow, 2=composite, 3=grab
      do lq=1,5
          sumd(lq)=0.
          sumw(lq)=0.
      end do

c loop around days
      do i=1,nq
          jdd=i+d0

c wusec tracks loads computed from composite samples
          wusec(i)=0.
```

```
          if(i+d0.gt.jdbase) then
              ipd=2
          else
              ipd=1
          endif

c meth=1 no flow
          if(flowu(i).le.0.) then
              wuse(i)=0.
              meth=1

c meth=2 use composite load
          else if(wcomp(i).gt.0.) then
              wuse(i)=wcomp(i)
              wusec(i)=wcomp(i)
              meth=2

c meth=3 use grab load
          else if(wgrab(i).gt.0.) then

c iratio = 0 use separate values
c iratio = 1 use base period values only
              if(iratio.eq.0) then
                  rr=ratio(ipd)
              elseif(iratio.eq.1) then
                  rr=ratio(1)
              endif
              if(rr.eq.0.) rr=1.
              meth=3
              wuse(i)=wgrab(i)*rr

c  diagnostic - flow after last grab sample used in calc loads
              if(jdd.gt.jg2.and.jdd.le.jdchk)
     &        qdang=qdang+flowu(i)
          endif

          sumw(meth)=sumw(meth)+wuse(i)
          sumd(meth)=sumd(meth)+1.

c output daily results on days with positive flow
          if(ofile1.ne.blank.and.meth.gt.1.and
     &    .flowu(i).gt.0.) then
              write(10,280) ulab,kdate(jdd),ipos,
     &        meth,flowu(i),wuse(i),
     &        ratv(wgrab(i),flowu(i))/factor,
     &        ratv(wcomp(i),flowu(i))/factor,
     &        ratv(wuse(i),flowu(i))/factor,ratio(ipd)
  280             format(a8,1x,i8,i3,i3,f9.1,f9.2,3f8.1,f10.3)
          endif
      end do
c end of date loop
```

```
c log file
      write(17,172) ulab,ncomp,kdate(jc1),kdate(jc2),ngrabt,
     &ngout,ngrab,kdate(jg1),kdate(jg2),
     &ratio(1),ratio(2),qdang
 172      format(1h",a8,1h",i5,2i9,3i5,2i9,2f8.4,f9.1)

      write(*,235)
  235     format(' station    ncomp   ngrab',
     &    '   days1  ratio1   days2  ratio2')
cc   &    '   days1  ratio1   days2  ratio2 usedratio') changed 2/27/98
      write(*,245) ulab,ncomp,ngrab,ncg(1),ratio(1),
     &ncg(2),ratio(2)
cc   &ncg(2),ratio(2),rr   changed 2/27/98
  245     format(1x,a8,3i8,f8.5,i8,2f8.5)

c  method summary
      write(*,305) (mname(i),i=1,nmeth)
  305     format(' breakdown of load estimation methods:'/
     &              ' method:  ',6a10)
      do i=1,nmeth
          sumd(nmeth+1)=sumd(nmeth+1)+sumd(i)
          sumw(nmeth+1)=sumw(nmeth+1)+sumw(i)
      enddo
      write(*,"(' days% :',6f10.1)")
     &(100.*ratv(sumd(i),sumd(nmeth+1)),i=1,nmeth)
      write(*,"(' load% :',6f10.1)")
     &(100.*ratv(sumw(i),sumw(nmeth+1)),i=1,nmeth)

      m=0
      nk=3

      kd= kdate(jymd1)/100

      do k=1,nk
          x(k)=0.
      enddo
      mm=0
      do i=1,nq
          jd=kdate(i+jymd1-1)/100
          if(jd.ne.kd) then
c output monthly totals for current station
              m=m+1
              cc=ratv(x(2),x(1))*qfac/factor
              if(ofile2.ne.blank)
     &        write(11,350) ulab,kd,mm,(x(k),k=1,2),cc,x(3)
  350             format(a8,i8,i4,2f10.1,f10.1,f10.1)
              qsave(m,nsta)=x(1)
              wsave(m,nsta)=x(2)
              wcsave(m,nsta)=x(3)
              iym(m)=kd
              do k=1,nk
                  x(k)=0.
```

```
              enddo
              mm=0
              kd=jd
          endif
          mm=mm+1
          x(1)=x(1)+flowu(i)*qfac
          x(2)=x(2)+wuse(i)
          x(3)=x(3)+wusec(i)
      end do

      m=m+1
      if(ofile2.ne.blank) then
          cc=ratv(x(2),x(1))*qfac/factor
          write(11,350) ulab,kd,mm,(x(k),k=1,2),cc,x(3)
      endif
      iym(m)=kd
      qsave(m,nsta)=x(1)
      wsave(m,nsta)=x(2)
      wcsave(m,nsta)=x(3)

c end loop around stations
      go to 10

c end of station list
  500 continue

c weighted sum over all stations
      usave(nsta)='Total'
      do i=1,m
          qsave(i,nsta)=0.
          wsave(i,nsta)=0.
          wcsave(i,nsta)=0.
          do j=1,nsta-1
              qsave(i,nsta)=qsave(i,nsta)+qsave(i,j)*isgn(j)
              wsave(i,nsta)=wsave(i,nsta)+wsave(i,j)*isgn(j)
              wcsave(i,nsta)=wcsave(i,nsta)+wcsave(i,j)*isgn(j)
          end do
      end do

c output monthly cross-tab
      if(ofile3.ne.blank) then
          open(12,file=ofile3,status="unknown")
          write(12,"(a64)") title
          write(12,*) 'flows in cfs-days'
          write(12,"(a6,2x,50a10)") 'month',(usave(i),i=1,nsta)
          do 530 i=1,m
  530         write(12,"(i6,50f10.1)") iym(i),(qsave(i,k),k=1,nsta)
          write(12,*)
          write(12,*) 'loads in kg'
          write(12,"(a6,2x,50a10)") 'month',(usave(i),i=1,nsta)
          do 540 i=1,m
  540         write(12,"(i6,50f10.1)") iym(i),(wsave(i,k),k=1,nsta)
```

```
          close(12)
      endif

c output totals before & after base period
      if(len_trim(ofile5).gt.0) then
c convert cfsd to kac-ft
          qqfac=24.*3600./43560./1000.
          open(12,file=ofile5)
          write(12,39) title,dbase
          do i=1,nsta
              x(1)=0.
              x(2)=0.
              y(1)=0.
              y(2)=0.
              tb=0
              ta=0
              do j=1,m
                  if(iym(j).gt.dbase/100) then
                      k=2
                      ta=ta+1
                  else
                      k=1
                      tb=tb+1
                  endif
                  x(k)=x(k)+qsave(j,i)
                  y(k)=y(k)+wsave(j,i)
              enddo
              ta=ta/12
              tb=tb/12
              write(12,38) usave(i),isgn(i),
     &        qqfac*x(1)/tb,y(1)/tb,ratv(y(1),x(1))*qfac/factor,
     &        qqfac*x(2)/ta,y(2)/ta,ratv(y(2),x(2))*qfac/factor
          enddo

 38       format(1h",a8,1h",i4,2(2f12.3,f10.1))
 39       format(a64/'Yearly Averages for Each Term & Time Period'/
     &    '           In Base Period <=',i8,8x,
     &    '       After Base Period'/
     &    'Term      Sign Flow(kaf/y)  Load(kg/y) Conc(ppb) '
     &    ' Flow(kaf/y) Load(kg/y)  Conc(ppb)')
      endif

c output monthly totals across all stations
      if(ofile4.ne.blank) then
          open(13,file=ofile4)
          write(13,"(a64)") title
          write(13,*) 'totals'
          write(13,567)
 567          format('month  flow(cfsd)    load(kg) conc(ppb)',
     &        ' grab(out) comp(out)  grab(in)  comp(in) comp(%)')

c loop around months
```

```
          do k=1,4
              y(k)=0.
          end do
          do i=1,m
              do k=1,4
                  x(k)=0.
              enddo
              do j=1,nsta-1
                  if(isgn(j).lt.0) then
c grab & composite inflows
                      x(3)=x(3)+wsave(i,j)-wcsave(i,j)
                      x(4)=x(4)+wcsave(i,j)
                  elseif(isgn(j).gt.0) then
c grab & composite outflows
                      x(1)=x(1)+wsave(i,j)-wcsave(i,j)
                      x(2)=x(2)+wcsave(i,j)
                  endif
              enddo
c composite as % of total absolute value
              x(5)=ratv(x(2)+x(4),x(3)+x(4)+x(1)+x(2))*100.
              write(13,560) iym(i),qsave(i,nsta),wsave(i,nsta),
     &        ratv(wsave(i,nsta),qsave(i,nsta))*qfac/factor,
     &        (x(k),k=1,5)
  560             format(i6,2f12.1,5f10.1,f8.1)
c sum over all months
              do k=1,4
                  y(k)=y(k)+x(k)
              enddo
              qsave(m+1,nsta)=qsave(m+1,nsta)+qsave(i,nsta)
              wsave(m+1,nsta)=wsave(m+1,nsta)+wsave(i,nsta)
              wcsave(m+1,nsta)=wcsave(m+1,nsta)+wcsave(i,nsta)
          enddo
          y(5)=ratv(y(2)+y(4),y(3)+y(4)+y(1)+y(2))*100.
          write(13,570) qsave(m+1,nsta),wsave(m+1,nsta),
     &    ratv(wsave(m+1,nsta),qsave(m+1,nsta))*qfac/factor,
     &    (y(k),k=1,5)
  570         format(/'total ',2f12.1,5f10.1,f8.1)
          close(13)
       endif
  999 close(10)
      end

      subroutine flowread(ifile,ibdate,iedate,clab,nq,values)

c modified March 2017 to include C10, C12, C12A, C4A, S236 and epd07
c modified Feb 2016 for A-1 FEB outflow structure g722
c modified Sept 2004 for STA3/4 inflows and outflows
c modified June 2004 for addition of g507, g204-g206
c modified August 2000 for various ECP elements
c reads daily flows - modified for STA-6 march 1998
c modified for STA-2 & STA-5 may 1999
c missing values not allowed in flow file
```

```
      character*8 clab
      character*8 labs(70 37)
      real values(1)

c these labels correspond to flow station labels in control file
      data labs /"s5a+s5aw",  "hgs5",     "wpbthru",  "s6",
     &           "s2/s6",     "hilthru",  "s7",       "s150",
     &           "s2/s7",     "thrulake", "thrus7",   "thrus150",
     &           "s8",        "s3",       "g88",      "g136",
     &           "holey",     "miathru",  "g250",     "g600",
     &           "g605",      "g606",     "g344a",    "g344b",
     &           "g344c",     "g344d",    "g328",     "g349b",
     &           "g350b",     "ebps",     "esps",     "g410",
     &           "g402a",     "g402b",    "g402c",    "g402d",
     &           "g404"       "g357",     "g204",     "g205",
     &           "g206",      "g507",     "g370",     "g372",
     &           "g376abc",   "g376def",  "g379abc",  "g379de",
     &           "g381ab",    "g381cdef", "ssdd",     "sfcd",
     &           "g371",      "g373" ,    "g373bc",   "g434",
     &           "g435",     "g722thru"/,   “c10”,     “c12a”,
     &           “c12”,      “c4a”,        “s236”,    “epd07”/

c number of daily flows in input file
      data nqin /70 37/
      rewind ifile
      do i=1,4
          read(ifile,*)
      enddo
      nq = 0
      do I=1,nqin
          call CONCAP(LABS(I),8)
      enddo
  90  read(ifile,222,end=100) dd,qhgs5,qs5as5aw,qs2,
     &qs6, qs7, qs150, qs3, qs8, qg88, qg136, qholey,
     &qg250,qg600,qg605,qg606,qg344a,qg344b,
     &qg344c,qg344d,qg328,qg349b,qg350b,
     &qebps,qesps, qg410,qg402a,
     &qg402b, qg402c, qg402d,qg404, qg357,qg204,qg205,
     &qg206, qg507, qg370, qg372, qg376a, qg376d, qg379a,
     &qg379d, qg381a, qg381c, qssdd, qsfcd, qg371,
     &qg373, qg373bc, qg434, qg435, qg722,
     &qc10, qc12a,qc12,qc4a,qs236,qepd07


c Modify East Beach, South Florida and South Shore flows to account for the portion of
c these basins that was previously in the EAA.

      qebps = 0.813 * qebps
      qssdd = 0.966 * qssdd
      qsfcd = 0.799 * qsfcd
```

```
 222      format(100f10.0)

c convert yymmdd to julian
      jfdate=jdate(dd)
      if(jfdate.lt.ibdate) then
          goto 90
      elseif(jfdate.gt.iedate) then
          return
      elseif(nq.eq.0.and.jfdate.ne.ibdate) then
          write(*,*) 'flow file starting date too late: ',jfix(dd)
          stop
      elseif(nq.gt.0.and.jfdate-jflast.ne.1) then
          write(*,*) 'flow file dates out of sequence: ',jfix(dd)
          stop
      endif
      nq=nq+1
      jflast=jfdate

c split s2 outflow between s6 (hillsboro qs2h) and S7 (nnriver qs2n) basins
      qs2n =(qs2 / (1.534769))
      qs2h = qs2 - qs2n

c Adds STA3/4 outflows to total North New River inflows
c by adding g722 as an inflow to EAA

      qin = amax1(0., qs2n) - amin1(0.,qs7) - amin1(0., qs150)
     & + amax1(0.,qg376a) + amax1(0.,qg376d) + amax1(0.,qg379a)
     & + amax1(0.,qg379d) + amax1(0.,qg722)

c total flow thru in north new river canal
c Combines G370 flow through to S7 (9/28/04)
c Add G371 to flow through term for WY06

      ft = amin1(qin, amax1(0., qs7)+amax1(0., qs150))+ amax1(0., qg370)-
     & amax1(0.,qg376a) - amax1(0.,qg376d)-amax1(0.,qg379a)-
     & amax1(0.,qg379d)+ amax1(0., qg371) + amax1(0.,qg434)
     & + amax1(0.,qg435))

      do i = 1, nqin
          if(clab .eq. labs(i)) then
              ind = i
              go to 200
          endif
      end do
      write(*,*) 'flow station label not found:', clab
      stop
      go to 29
 200  goto (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,
     &20,21,22,23,24,25,26,27,28,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,
     &45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65), ind

c s5a+s5aw    outflow
```

```
 1    x = qs5as5aw
      go to 29

c hgs5 outflow
 2    x = qhgs5
      go to 29

c s5athru west palm beach canal flowthru
 3    if(qhgs5 .le. 0 ) then
          x = 0.
      else
          x = amin1(qhgs5, amax1(qs5as5aw+qg250-qebps, 0.))
      end if
      go to 29

c s6 outflow
 4    x = qs6
      go to 29

c s2/s6 s2 outflow to lake from hillsboro basin
 5    x = qs2h
      go to 29

c s6thru hillsboro canal flowthru
 6    if(qs2h .le. 0) then
          x = 0.
      else
          x = amin1(qs2h, amax1(qs6-qesps, 0.))
      end if
      go to 29

c s7 outflow
 7    x = qs7
      go to 29

c s150 outflow
 8    x = qs150
      go to 29

c s2/s7 outflow to lake from s7 basin
 9    x = qs2n
      go to 29

c thrulake - nnriver flowthru from lake
 10   if(qin .eq. 0) then
          x = 0.
      else
          x = amax1(0., qs2n) * ft / qin
      end if
      go to 29

c thrus7 - nnriver flowthru from s7
```

```
 11   if(qin .eq. 0) then
          x = 0.
      else
          x = -amin1(0., qs7) * ft / qin
      end if
      go to 29

c thrus150 - nnriver flowthru from s150
 12   if(qin .eq. 0) then
          x = 0.
      else
          x = -amin1(0., qs150) * ft / qin
      end if
      go to 29

c s8 outflow
 13   x = qs8
      go to 29

c s3 outflow
 14   x = qs3
      go to 29

c g88 inflow
 15   x = qg88
      go to 29

c g136 inflow
 16   x = qg136
      go to 29

c holeyland
 17   x = qholey
      go to 29

c s8 miami canal flowthru
 18   if(qs3 .le. 0) then
          x = 0.
      else
          x = amin1(qs3, amax1(0.,
     &    qs8-qg88-qg136+qholey-qg606-qg605+qg349b+qg350b-qg344a-
     &    qg344b-qqg344c-g344d-qg402a-qg402b-qg402c-qg402d+qg410+
     &    qg404 + qg357-qg204-qg205-qg206+qg507+qg372- qg381a - qg381c-
     &    qssdd - qsfcd + qg373 + qg373bc)
      endif
      goto 29

c enr inflow  - eaa outflow
 19   x=qg250
      goto 29

c sta6 inflow
```

```
 20   x=qg600
      goto 29

c sta6 bypass
 21   x=qg605
      goto 29

c sta6 outflow
 22   x=qg606
      goto 29

c sta5 outflows
 23   x=qg344a
      goto 29
 24   x=qg344b
      goto 29
 25   x=qg344c
      goto 29
 26   x=qg344d
      goto 29

c sta2 supplementary inflow

 27   x=qg328
      goto 29

c sta5 inflows from miami canal
 28   x=qg349b
      goto 29
 30   x=qg350b
      goto 29

c East Beach outflow - EAA inflow
 31   x=qebps
      goto 29

c East Shore outflow - EAA inflow
 32   x=qesps
      goto 29

c Rotenberger inflow  - EAA outflow
 33   x=qg410
      goto 29

c Rotenberger outflows - EAA inflow
 34   x=qg402a
      goto 29
 35   x=qg402b
      goto 29
 36   x=qg402c
      goto 29
 37   x=qg402d
```

```
      goto 29

c G404 outflow
 38   x=qg404
      goto 29

c G357 outflow
 39   x=qg357
      goto 29
c G204 inflow
 40   x=qg204
       goto 29
c G205 inflow
 41   x=qg205
       goto 29
c G206 inflow
 42   x=qg206
       goto 29
c G507 outflow
 43   x=qg507
       goto 29
c G370 outflow
 44   x=qg370
       goto 29
c G372 outflow
 45   x=qg372
       goto 29
c G376abc inflow
 46   x=qg376a
       goto 29
c G376def inflow
 47   x=qg376d
       goto 29
c G379abc inflow
 48   x=qg379a
       goto 29
c G379de inflow
 49   x=qg379d
       goto 29
c G381ab inflow
 50   x=qg381a
       goto 29
c G381cdef inflow
 51   x=qg381c
       goto 29
c SSDD inflow
 52   x=qssdd
       goto 29
c SFCD inflow
 53   x=qsfcd
       goto 29
c G371 outflow
```

```
 54   x=qg371
       goto 29
c G373 outflow
 55   x=qg373
       goto 29
c G373BC outflow
 56   x=qg373bc
       goto 29
c G434 outflow
 57   x=qg434
      goto 29
c G435 outflow
 58   x=qg435
      goto 29
c G722 A-1 FEB flow through
 59   if(qin .eq. 0) then
          x = 0.
      else
          x = amax1(0., qg722) * ft / qin
      end if
      go to 29
c East Beach outflow to Lake Okeechobee - New EAA outflow
 60   x=qc10
      goto 29
c Closter outflow to Lake Okeechobee - New EAA outflow
 61   x=qc12a
      goto 29
c East Shore outflow to Lake Okeechobee - New EAA outflow
 62   x=qc12
      goto 29
c South Shore outflow to Lake Okeechobee - New EAA outflow
 63   x=qc4a
      goto 29
c South Florida Conservancy outflow to Lake Okeechobee - New EAA outflow
 64   x=qs236
      goto 29
c South Florida Conservancy outflow to Industrial Canal - New EAA outflow
 65   x=qepd07
      goto 29


 29   values(nq) = x

      go to 90

 100  iedate=jfdate
      return
      end
c subroutines in subr.for


c subroutines for eaa software
```

```
c
c date functions
c
c date sequence number = number of days from Jan 1, 1900 (= Lotus 123 date)
c All reals=real*4, All integers = Integer*4
c function               inputs          returns
c idate(iy,im,id)        iy,im,id        date sequence number
c jdate(d)               yymmdd          date sequence number
c kkdate(d)              yymmdd          yyyymmdd
c jdatei(k)              yyyymmdd        date sequence number
c kdate(j)               date sequence   yyyymmdd
c ddate(j)               date sequence   yymmdd
c sub yymmdd(d,iy,im,id) yymmdd          iy,im,id
c sub iymmdd(k,iy,im,id) yyyymmdd        iy,im,id
c idbt(k1,k2)            2 x yyyymmdd    days between 2 dates, inclusive
c imonth(char3)          character month month number
c mday(iy,im)            iy,im           number of days in month

        function idate(iy,im,id)

       integer mdy(12)
        DATA MDY/0,31,59,90,120,151,181,212,243,273,304,334/

c returns days from Jan 1, 1900 for input iy,im,id
c year in yy format

c years
       jy=iy+1900

c if iy<50 assume turn of century
       if(iy.lt.50) jy=jy+100

        idate=0
c check for valid date
        if(im.le.0.or.im.gt.12) return
       if(id.lt.1.or.id.gt.mday(iy,im)) return

        idate=mdy(im)+(jy-1900)*365.+id+(jy-1897)/4

c add 1 day if leap year and after february
        if(mod(jy,4).eq.0.and.im.gt.2) idate=idate+1
        return
        end

            function jdate(d)
c returns date sequence number for input d in yymmdd format
            call yymmdd(d,iy,im,id)
            jdate=idate(iy,im,id)
            return
            end

       function jdatei(id)
```

```
c returns date sequence number for input id in yyyymmdd format
       j=id-19000000
       jdatei=jdate(float(j))
       return
       end



       function kkdate(d)
c returns yyyymmdd for input in yymmdd
       kkdate=d+19000000
       if(d.le.500000.) kkdate=kkdate+1000000
       return
       end



       function kdate(id)
c returns integer date yyyymmdd for julian date id
       kdate=ddate(id)
       if(kdate.eq.0) then
              return
              elseif(kdate.lt.500101) then
              kdate=kdate+20000000
              else
              kdate=kdate+19000000
              endif
       return
       end

        function ddate(id)

c returns date in yymmdd format for input id =
c      number of days from Jan 1, 1900

             ddate=0.
             if(id.le.0) return

c first find year, roughly
             jy=id/367
 13          if(idate(jy+1,1,1).le.id) then
                    jy=jy+1
                    goto 13
                    endif

c find month
             do 10 jm=2,12
               if(idate(jy,jm,1).gt.id) goto 12
 10          continue
 12          jm=jm-1

c find day
```

```
             jd=id-idate(jy,jm,1)+1

ccc adjust year
            if(jy.gt.99) jy=jy-100

c compute ddate
             ddate=10000.*jy+jm*100.+jd
             return
             end


       subroutine yymmdd(date,iy,im,id)

c convert real date yymmdd to integer year yy, month, day

       iy=0
       im=0
       id=0
       iy=jfix(date/10000.)
       im=jfix((date-iy*10000.)/100.)
       id=jfix(date-iy*10000.-im*100.)
       return
       end

       subroutine iymmdd(idate,iy,im,id)

c convert integer date to integer year, month, day

       iy=0
       im=0
       id=0
       iy=jfix(idate/10000)
       im=jfix((idate-iy*10000)/100)
       id=jfix(idate-iy*10000-im*100)
       return
       end

       function mday(iy,im)

c number of days in current month

       dimension mdy(12)
       data mdy/31,28,31,30,31,30,31,31,30,31,30,31/
       mday=0
       if(im.gt.12.or.im.lt.1) return
       mday=mdy(im)
       if(im.eq.2.and.mod(iy,4).eq.0.) mday=mday+1
       return
       end

          subroutine outlyr(x,y,n,sig,prb,nrej)
c screen for outliers - linear regression y(n) vs. x(n)
```

```
c sig = rejection significance level
c returns prb(n) = significance level for rejection
c nrej = number of screened data points
c snedecor and cochran, p. 157-158
         dimension x(1),y(1),prb(1)
         if(n.le.3) return
         sy=0.
         sy2=0.
         sx=0.
         sx2=0.
         sxy=0.
         nrej=0
         nn=n
c first compute regression
         do 100 i=1,n
             prb(i)=1.
             sy=sy+y(i)
             sx=sx+x(i)
             sy2=sy2+y(i)*y(i)
             sx2=sx2+x(i)*x(i)
             sxy=sxy+x(i)*y(i)
 100         continue
         txy=sxy-sx*sy/n
         tx2=sx2-sx*sx/n
         ty2=sy2-sy*sy/n
         tx=sx/n
         ty=sy/n
         b=txy/tx2
         a=ty-b*tx
c find maximum residual
 10      rmax=0.
         j=0
         do 200 i=1,n
         if(prb(i).eq.1.) then
            resid=abs(y(i)-b*x(i)-a)
             if(resid.gt.rmax) then
               j=i
               rmax=resid
               endif
            endif
 200     continue
         if(j.le.0) return
c compute regression with point j excluded
         nn=nn-1
         if(nn.le.3) return
         sxy=sxy-x(j)*y(j)
         sx2=sx2-x(j)*x(j)
         sy2=sy2-y(j)*y(j)
         sy=sy-y(j)
         sx=sx-x(j)
         txy=sxy-sx*sy/nn
         tx2=sx2-sx*sx/nn
```

```
         ty2=sy2-sy*sy/nn
         tx=sx/nn
         ty=sy/nn
         b=txy/tx2
         a=ty-b*tx
         se2=(ty2-b*b*tx2)/(nn-2)
         if(se2.le.0.) return
         se=sqrt(se2)
c test residual
         resid=y(j)-b*x(j)-a
         sr=se*sqrt( 1.+1./nn + (x(j)-tx)**2/tx2 )
         t=resid/sr
         prb(j)=probt(t,nn-2)*(nn+1)
         if(prb(j).gt.sig) return
         nrej=nrej+1
         go to 10
         end

        subroutine eint3(n,e,x,ni,xi)
c interpolation
c inputs e(i),x(i),i=1,n
c output ei(i),xi(j),j=1,ni
c      ei(j)==j

        dimension x(1),e(1),xi(1)
c
         i=1
         do 100 j=1,ni
            if(j.gt.e(i)) go to 110
              xi(j)=x(i)
              go to 100
 110        if(j.lt.e(n)) go to 120
              xi(j)=x(n)
              go to 100
 120        if(j.le.e(i+1)) go to 125
              i=i+1
              go to 120
 125        f=(j-e(i))/(e(i+1)-e(i))
            xi(j)=(1.-f)*x(i)+f*x(i+1)
 100    continue
        return
        end

          subroutine xred(ix,y,n)
c replaces x() and y() with running means
c for common values of ix()
c length n
c destroys input vectors
          dimension y(1)
          integer ix(1),ixlast
          if(n.le.1) return
          ixlast=ix(1)
```

```
          m=1
          k=0
          sum=y(1)
          do 10 j=2,n
          if(ix(j).ne.ixlast) then
             k=k+1
             ix(k)=ixlast
             y(k)=sum/m
             ixlast=ix(j)
             m=0
             sum=0.
             endif
          m=m+1
          sum=sum+y(j)
 10       continue
          k=k+1
          ix(k)=ixlast
          y(k)=sum/m
          n=k
          return
          end


       function ratv(x1,x2)
c divide x1 by x2 or set to 0.
       if(x2.ne.0.) then
           ratv=x1/x2
           else
           ratv=0.
           endif
       return
       end

       function ic8(c1,c2)
c compares strings c1 and c2
c returns 1 if they are identical
c case not significant
       character*8 c1,c2,c3,c4
c
       c3=c1
       call concap(c3,8)
       c4=c2
       call concap(c4,8)

       if(c3.eq.c4) then
            ic8=1
           else
            ic8=0
           endif
        return
        end
```

```
       function match(n,label,char)
c lookup char in label()
       character*8 label(1),char
       match=0
       do 10 i=1,n
       if(ic8(char,label(i)).gt.0) then
         match=i
         return
         endif
 10    continue
       return
       end

        function probg(s,r,z)
c  f statistic
c used with probf and probt
        u=2./9./s
        v=2./9./r
        q=abs((1.-v)*(z**.333333)-1.+ u)/sqrt(v*z**.6666667+u)
        if (r.lt.4) q=q*(1.+.08*(q**4)/(r**3))
        probg=.5/(1.+q*(.196854+q*(.115194+q*(3.44e-04+q*.019527))))**4
        return
        end

        function probt(t,n)
c  two-tailed - modified from "some common basic programs"
        probt=1.0
        if(t.eq.0..or.n.le.0) return
        w=t*t
        if (w.lt..5) then
           s=n
           r=1.
           z=1./w
           else
           s=1.
           r=n
           z=w
           endif
 20     probt=probg(s,r,z)
        if(w.lt..5) probt=1.-probt
        return
        end

       subroutine concap(string,n)
c convert string to caps
       character*1 string(1)
       do i=1,n
       j=ichar(string(i))
       if(j.gt.96.and.j.lt.123) string(i)=char(j-32)
       enddo
       return
       end
```

```
      subroutine pquote(cin,cout)
c returns string cin enclosed in quotes
c     xxxxx ---> "xxxxx"
      character*16 cin,cout,ctemp
      character*1 cc(16)
      equivalence (ctemp,cc(1))
      cout=' '
      ctemp=cin
      n=len_trim(cin)
      cc(n+1)='"'
      write(cout,1) (cc(i),i=1,n+1)
 1     format('"',20a1)
      return
      end


      function idbt(id1,id2)
c days between id1 & id2, inclusive
      idbt=jdatei(id2)-jdatei(id1)+1
      return
      end

      function imonth(c)
c convert character month to integer month
      character*3 c
      character*3 mlab(12) /'JAN','FEB','MAR','APR','MAY','JUN',
     &              'JUL','AUG','SEP','OCT','NOV','DEC'/

      imonth=0
      if(len_trim(c).le.0) return

      call concap(c,3)
      do i=1,12
              if(c.eq.mlab(i)) goto 5
             enddo
      write(*,*) 'Invalid Month =', c
      stop
 5    imonth=i
      return
      end
```

APPENDIX A3.2
FLOW COMPUTATION METHODS USED TO CALCULATE EAA BASIN FLOWS

Table of Contents

GATED SPILLWAYS

Parameters

C_{cf} = discharge coefficient for controlled free flow
C_{cs} = discharge coefficient for controlled submerged flow
C_{ot} = discharge coefficient for over-the-top flow
C_{uf} = discharge coefficient for uncontrolled free flow
C_{us} = discharge coefficient for uncontrolled submerged flow
G_o = gate opening, in feet
g = acceleration due to gravity, 32.2ft/sec^2
H = approach head over the spillway sill, which is the difference between the upstream stage and the sill elevation, in feet
H_g = approach head over the gate, in feet
h = submergence head over the spillway sill, which is the difference between the downstream stage and the sill elevation, in feet
L = length of spillway sill perpendicular to flow, in feet
n_1 = exponent of approach head
n_2 = exponent of submergence head
n_3 = exponent of total head
n_4 = exponent of gate opening
W = width of gate, in feet

Uncontrolled Free Flow

$$Q = C_{uf} L H^{n_1}$$

Spillway
S-5AS
S-7
S-8
S-351
S-352
S-354
G-371
G-373

Uncontrolled Submerged Flow

$$Q = C_{us} L h^{n_2} (H - h)^{n_3} \sqrt{2g}$$

Spillway
S-5AS
S-7
S-8
S-351
S-352
S-354
G-371
G-373

Controlled Free Flow

$$Q = C_{cf} L G_o \sqrt{2g(H - 0.5G_o)}$$

Spillway
S-5AS
S-7
S-8
S-351
S-352
S-354
G-371
G-373

Controlled Submerged Flow

$$Q = C_{cs} L G_o^{n_4} h^{n_2} \sqrt{2g(H-h)}$$

Spillway
S-5AS
S-7
S-8
S-351
S-352
S-354
G-371
G-373

Over-the-top Flow

$$Q = C_{ot} W H_g^{1.5} \sqrt{2g}$$

Spillway
S-5AS
S-7
S-8
S-351
S-352
S-354

PUMPS

Parameters

C	=	coefficient of discharge for siphon
C_0-C_9	=	coefficients of pump rating equation
H	=	head, downstream stage minus upstream stage, in feet
H_{fact}	=	normalizing head factor, in feet
H_{hi}	=	head from affinity laws corresponding to the high rpm rating equation, in feet
H_{lo}	=	head from affinity laws corresponding to the low rpm rating equation, in feet
N	=	engine speed, in rpm
N_{fact}	=	normalizing engine speed factor, in rpm
N_{hi}	=	engine speed of high rating equation, in rpm
N_{lo}	=	engine speed of low rating equation, in rpm
N_{min}	=	minimum engine speed below which no discharge is possible, in rpm
n	=	exponent of head for siphon
X	=	normalized head parameter
Y	=	normalized engine speed parameter

Pump Flow

Constant-speed Pump
A single-variable polynomial is used.

$$Q = C_0 + C_1 H + C_2 H^2 + C_3 H^3$$

Pump
G-200A
G-200B
G-349B
G-350B

Variable-speed Pump
Interpolation of single-variable polynomials is performed. The pump affinity laws are used to obtain the adjusted head, H_{lo}:

$$H_{lo} = H(\frac{N_{lo}}{N})^2$$

The adjusted head H_{lo} is used to compute Q_{lo}.

$$Q_{lo} = C_0 + C_1 H_{lo} + C_2 H_{lo}^2 + C_3 H_{lo}^3$$

Pump
S-5A
S-6
S-7
S-8
G-404
G-410
EBPS
ESPS
G-507
G-370
G-372
SSDD
SFCD
G-434
G-435
C-10
C-12A
C-12
C-4A
S236
EPD07

The adjusted head, H_{hi} is:

$$H_{hi} = H(\frac{N_{hi}}{N})^2$$

The adjusted head H_{hi} is used to compute Q_{hi}.

$$Q_{hi} = C_0 + C_1 H_{hi} + C_2 H_{hi}^2 + C_3 H_{hi}^3$$

The affinity laws are used to obtain the discharge Q at engine speed N:

$$Q = Q_{lo} + (Q_{hi} - Q_{lo})(\frac{N - N_{lo}}{N_{hi} - N_{lo}})$$

Variable-speed Pump with Very Variable Head
A two-variable polynomial used. The normalized head and engine speed are:

$$X = \frac{H}{H_{fact}}$$

$$Y = \frac{N - N_{\min}}{N_{fact}}$$

Pump
S-2
S-3

The pump discharge is:

$$Q = C_0 + C_1 X + C_2 Y + C_3 X^2 + C_4 XY + C_5 Y^2 + C_6 X^3 + C_7 YX^2 + C_8 XY^2 + C_9 Y^3$$

Siphon Flow
The siphon discharge is:

$$Q = CH^n$$

Siphon
S-6

CULVERTS

Refer to:

Fan, A. (October 1985). *A General Program to Compute Flow through Gated Culverts* (Technical Memorandum). West Palm Beach: South Florida Water Management District, West Palm Beach.

Parameters

The parameter defined here correspond to the variables defined by A. Fan.

Barrel	=	barrel shaped coding, "0" = circular, "1" = box
C	=	orifice flow coefficient due to inlet shape
C_w	=	weir flow coefficient (flashboard)
D	=	diameter of pipe culvert or height of box culvert, in feet
G_h	=	height of gate, in feet
G_{type}	=	gate type coding, "0" = circular, "1" = rectangular, "2" = weir
G_w	=	width of gate, in feet
IN_{el}	=	inlet invert elevation, in feet m.s.l. or NGVD
K	=	entrance loss coefficient due to shape of gate edge
L	=	length of culvert, in feet
N	=	number of barrels
n	=	Manning's roughness coefficient
OUT_{el}	=	outlet invert elevation, in feet m.s.l or NGVD
r	=	refernece elevation for flashboard elevation, in feet m.s.l. or NGVD
S_{wb}	=	total side weir length (riser or wing wall), in feet
S_{we}	=	side weir crest elevation (riser or wing wall), in feet
W	=	width of box culvert
W_b	=	weir length (flashboad)

Culverts	Culverts
G-136	G-402A
G-88	G-402B
S-150	G-402C
S-5AE	G-402D
G-357	G-204
G-205	G-206
G-376A	G-376D
G-379A	G-379D
G-381A	G-381C
G-722	

APPENDIX A4
EAA FARM SCALE ALLOCATION

This Appendix sets forth the procedure the District will follow in the future to regulate total phosphorus (TP) loads from individual farms when the EAA Basin has been determined to be "Not In Compliance" with the Target or Limit according to the procedures set forth in Appendix A3. Within the context of the methodology described, "farm" refers to a hydrologic drainage area described by the District in the permits as a basin ID.

1. Individual permittees may participate in an Early Baseline Option to establish a base-year data set by monitoring the farm-level water quality and quantity discharge for a period of one year beginning January 1, 1993. The permittee who elects this option will be required to have approved BMPs in place by January 1, 1994. These permittees will be required to reduce their rainfall-adjusted phosphorus loading by at least 25 percent as compared to the rainfall-adjusted base-year loading. The procedure outlined in Appendix A3 will be used for rainfall adjustment.

2. The base year data will be verified for reasonableness. The determination will be based on an analysis of outliers, an analysis of consistency with existing total phosphorus data, rainfall data, and other relevant information. Permitted structures for which monitoring data are determined to be unreasonable shall be excluded from further participation in the Early Baseline Option.

3. In determining compliance in any future year, the measured EAA total basin load for the specified May 1 - April 30 period will be compared to the Target for the EAA Basin for the specified May 1 - April 30 period, calculated according to Appendix A3. The comparison is represented by the following ratio:

$$Y = \text{Target} / \text{Measured}$$

4. The Unit Area Loading (UAL) for each permitted structure and acreage tributary to it will be calculated. The calculation will be based on concentration and flow data reported by the permittee pursuant to the approved monitoring plan for the specified May 1 - April 30 period. The UAL will be calculated according to the following equation:

$$UAL_i = L_i / A_i$$

where,

UAL_i = Unit Area Load for $Farm_i$ (lbs/acre-year)

L_i = Load calculated by SFWMD from flow and concentration data supplied by Farm i, plus other data obtained by SFWMD, as necessary (lbs/year)

A_i = Area of Farm i (acres)

5. The UAL will be adjusted to reflect average rainfall conditions observed in the 1979 - 1988 base period and to reflect spatial variations in rainfall among EAA subbasins in the current year. The Adjusted Unit Area Load ($AUAL_i$) will be based on observed rainfall in the corresponding EAA subbasin (S5A, S6, S7, or S8) in the specified May 1 - April 30 period. It will be calculated according to the following:

$$AUAL_i = UAL_i \ (R_{am} / R_a)^{2.868}$$

$$R_a = \exp [X + 1.053 (C-C_m) - 0.1170 (S-S_m)]$$

where,

m = subscript denoting average value of rainfall statistic in base period for EAA Subbasin containing Farm i (see attached Table)

R_{am} = base period log-mean adjusted rainfall for EAA Subbasin containing Farm i (inches, see attached Table)

R_a = Adjusted subbasin rainfall in current year (inches)

X, C, S = Values as defined in Appendix A3 and computed for each subbasin

Basin	X_m	C_m	S_m	R_{am}
EAA Total	3.866	0.7205	0.7339	47.73
S5A[1]	3.918	0.7636	0.9999	50.31
S6[2]	3.907	0.7302	0.7476	49.77
S7	3.835	0.7198	0.6112	46.27
S8[3]	3.822	0.8409	0.8409	45.68

[1]Also to be used for East Beach Water Control District basin ID 50-033-02.
[2]Also to be used for Agricultural Lease 3420 basin ID 50-077-01, and East Shore Water Control District basin ID 50-080-01.
[3]Also to be used for South Shore Drainage District basin ID 50-081-02, and South Florida Conservancy District basin ID 50-010-06.

6. The AUAL for the entire EAA Basin (ALOAD, lbs/yr), including basin IDs 50-033-02, 50-077-01, 50-081-02, and 50-010-06, will be calculated according to the following:

$$ALOAD = SUM \ [AUAL_i * A_i]$$

7. The Farm -Level Target Load (FTLOAD, lbs/yr) will be calculated based on the

assumption that the percentage reduction in total load required at the Farm scale equals the percentage reduction required at the Basin scale. The calculation will be based on the following:

$$FTLOAD = ALOAD * Y$$

8. For those permittees who elected to participate in the Early Baseline Option, compliance will be determined by adjusting both current and base year measured loads to average rainfall conditions using the procedure given in paragraph 5 above. Permittees who have achieved the 25% load reduction will be identified by comparing the adjusted load for the base year with the adjusted load for the current year.

9. Permittees who did not elect to participate in the Early Baseline Option are subject to a Maximum Unit Area Loading (MUAL, lbs/acre-yr) discharge limit, which is computed by solving the following equation:

$$FTLOAD = SUM [MUAL * A_j] + SUM [AUAL_i * A_i]$$

The first summation (j) is over all Farm s with $AUAL_j$ greater than MUAL, excluding those who have taken the Early Baseline Option and achieved a minimum 25% load reduction. The second summation is over all remaining Farms, which include (a) Farms with $AUAL_i$ below MUAL; and (b) Farms which elected the Early Baseline Option and met the minimum 25 percent load reduction requirement.

10. Revised BMP plans will be required for all permitted structures and tributary acreages whose $AUAL_j$ exceed MUAL. Revised BMP plans will also be required from all permittees who elected the Early Baseline Option, but did not achieve at least a 25 percent load reduction. Compliance and enforcement procedures are set forth in Rule 40E-63.145(3), (4), and (5), F.A.C.