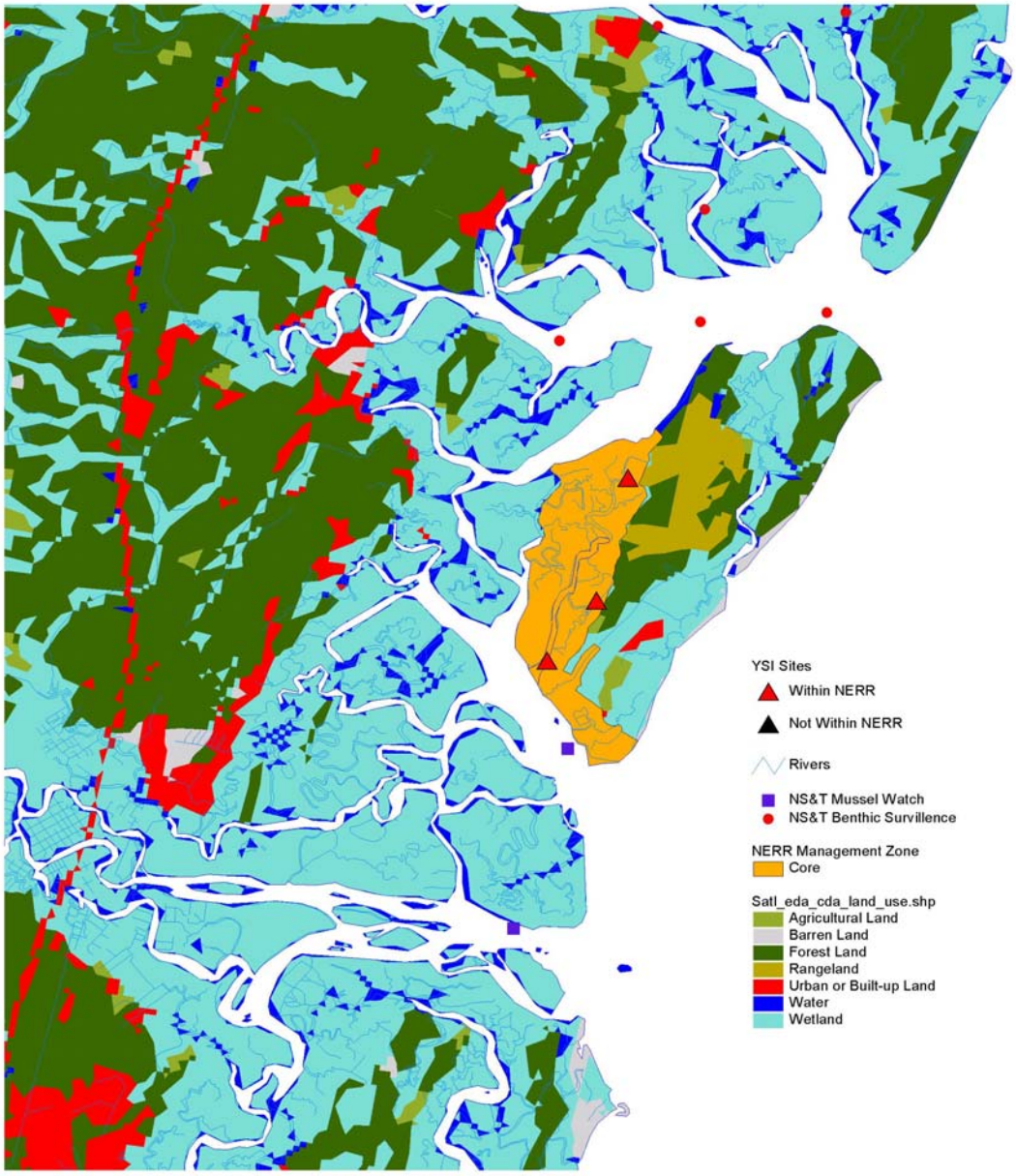
# Sapelo Island



Sapelo Island, Flume Dock (SAPFD)

*Characterization (Latitude = 31°28' 58"N; Longitude = 81°17' 03"W)*
Tides at Flume Dock are semidiurnal and range from 2 m to 3 m (average 2.4m). The monitoring site is located on the upper Duplin River on Sapelo Island, 100 m north of Moses Hammock. The water body is approximately 12 km long (mainstream linear dimension). At the sampling site, the depth is approximately 4 m MHW and the width is approximately 20 m MHW. Creek bottom habitats are predominanlty composed of a sand/mud mix with a high silt-clay composite and devoid of bentic macrophytes. The dominant marsh vegetation near the sampling site is *Spartina alterniflora* with pockets of *Juncus* sp. at the higher elevations of the basin. The dominant upland vegetation includes live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*) and loblolly pine (*Pinus taeda*). Upland land use near the sampling site includes a primitive campground with an on-site septic system and intermittent upland logging activities. Activities that potentially impact the site include light boat traffic and possibly, logging activities with associated runoff.

*Descriptive Statistics*
Seventy-six deployments were made at this site between Jan 1996 and Dec 1998, with equal coverage during all seasons (Figure 147). Mean deployment duration was 13.7 days. Seven deployments (3 in 1996, 1 in 1997, and 3 in 1998) were less than 10 days.

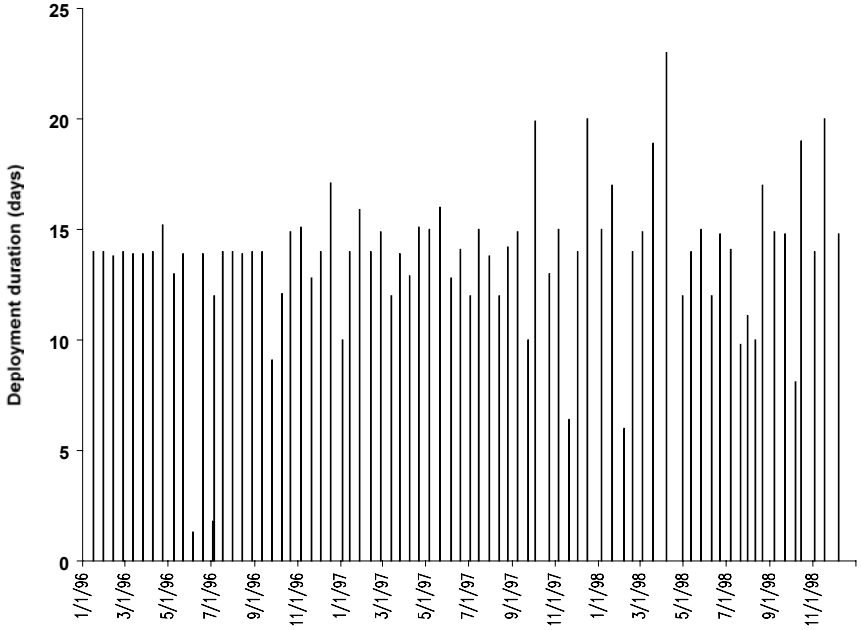



**Figure 147**. Sapelo Island, Flume Dock deployments (1996-1998).

Forty-two percent of depth data in 1996 were included in analyses; no depth data were collected in 1997 and 1998. Sensors were suspended from a floating platform approximately 6 m from the shoreline and deployed at a mean water depth of 1.8 m. Scatter plots suggest moderate fluctuation (0.5-1.0 m) in depth, except for Dec 1996 (> 1 m) and Jan, Mar 1996 (< 0.5 m). Because this sensor was suspended from a floating rather than a fixed platform, the depth data were not comparable to data from other sites. Harmonic regression analysis attributed 68% of depth variance to 12.42 hour cycles, 25% of depth variance to interaction between 12.42 hour and 24 hour cycles, and 7% of depth

variance to 24 hour cycles.

Ninety-six percent of annual water temperature data were included in analyses (90% in 1996, 98% in 1997 and 1998). Water temperature followed a seasonal cycle, with mean water temperatures 12-14°C in winter and 28-30°C in summer (Figure 148). Minimum and maximum water temperatures between 1996-1998 were 6.7°C (Jan 1997) and 32.8°C (Aug 1997), respectively. Scatter plots suggest strong fluctuations (≤ 3°C) in daily water temperature and slightly stronger fluctuations (≤ 5°C) in bi-weekly water temperature throughout the data set. Harmonic regression analysis attributed 53% of temperature variance to interaction between 12.42 hour and 24 hour cycles, 34% of temperature variance to 24 hour cycles, and 13% of temperature variance to 12.42 hour cycles.

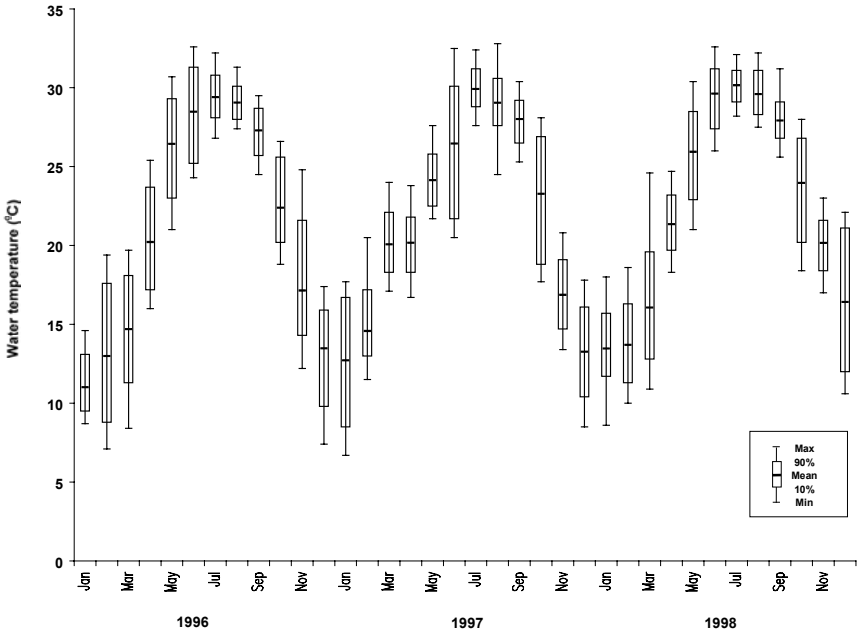



**Figure 148**. Water temperature statistics at Flume Dock, 1996-1998.

Ninety-five percent of annual salinity data were included in analyses (90% in 1996, 97% in 1997, and 98% in 1998). Mean salinity followed a seasonal cycle, with maximum annual salinity in summer and minimum annual salinity in winter (Figure 149). Mean winter salinity in 1998 (8-11 ppt) was substantially lower than mean winter salinity in 1996 and 1997 (16-23 ppt), which was probably due to increased rainfall and runoff during this El Nino winter. Mean summer salinity in all three summers was similar (25-27; 29 ppt). Minimum and maximum salinity between 1996-1998 was 4.3 ppt (Mar 1998) and 32.2 ppt (Jul 1996), respectively. Scatter plots suggest minor fluctuations (1 ppt) in daily salinity and moderate fluctuations (1-5 ppt) in bi-weekly salinity throughout the data set, with strong (>10 ppt) fluctuations observed for bi-weekly salinity during episodic events in Feb 1996, Aug and Oct 1997, and spring 1998. Harmonic regression analysis attributed 47% of salinity variance to 12.42 hour cycles, 36% of salinity variance to 24 hour cycles, and 17% of salinity variance to interaction between 12.42 hour and 24 hour cycles.

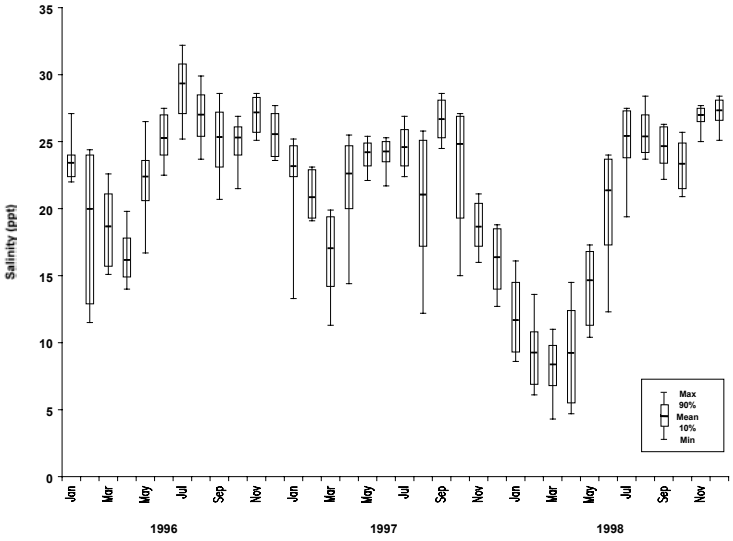



**Figure 149**. Salinity statistics at Flume Dock, 1996-1998.

Seventy-nine percent of annual dissolved oxygen (% saturation) data were included in analyses (81% in 1996, 1997 and 75% in 1998). Mean DO was 45-108% saturation throughout the data set and followed a seasonal cycle, with greatest DO (70-100% sat) in winter and least DO in summer (45-60% sat). Minimum and maximum DO between 1996-1998 was 1.5% saturation (May 1996) and 204.8% saturation (May 1996), respectively. Hypoxia was observed between May-Aug in 1996-1998 and, when present, hypoxia persisted for < 2% of the first 48 hours post-deployment on average (Figure 150). Supersaturation was observed in three months (May 1996, Jan 1997, and Aug 1998) and, when present, persisted for 17.4% of the first 48 hours post-deployment on average. Scatter plots suggest strong fluctuations (40-100%) in percent saturation throughout the data set, with >200% fluctuations observed in May 1996. Harmonic regression analysis attributed 49% of DO variance to interaction between 12.42 hour and 24 hour cycles, 35% of DO variance to 12.42 hour cycles, and 16% of DO variance to 24 hour cycles.

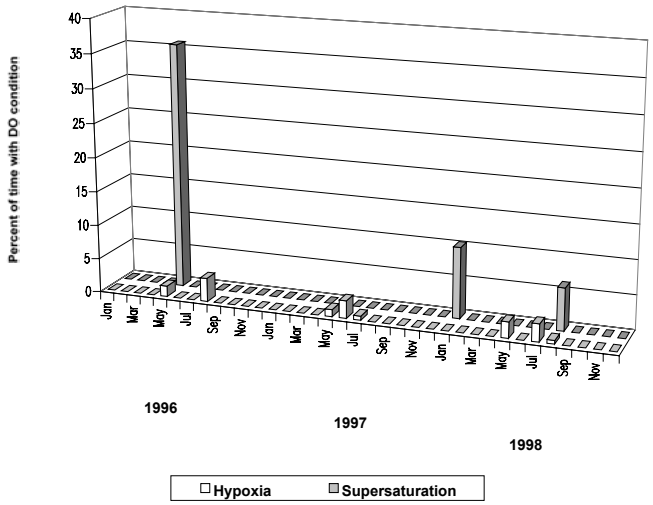



**Figure 150**. Dissolved oxygen extremes at Flume Dock, 1996-1998.

Sapelo Island, Marsh Landing (SAPML)

*Characterization (Latitude = 31°25'04"N; Longitude = 81°17'46"W)*
Tides at Marsh Landing are semidiurnal and range from 2 m to 3 m (average 2.4 m). The monitoring site is located on the lower Duplin River on Sapelo Island. The Duplin River is about 12 km long (mainstream linear dimension). At the sampling site, the depth is 7.5 m MHW and the width is approximately 130 m. Creek bottom habitats at the site are predominantly composed of sand with a slight mix of clay/silt. The dominant marsh vegetation near the sampling site is *Spartina alterniflora*. Upland vegetation is typified by maritime forest composed of live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*) and loblolly pine (*Pinus taeda)*. Upland land use near the sampling site includes intermittent selective logging of mature (70 years old) loblolly pine and maintenance of a grass airstrip. Activities that potentially impact the site include fairly heavy boat traffic and possible nutrient/sediment impacts from upland runoff associated with logging activities. The monitoring site is located on a floating dock adjacent to the primary ferry dock for the island (100-120 residents). The ferry makes 2-3 round trips to the mainland and back each day.

*Descriptive Statistics*
Seventy-five deployments were made at this site between Jan 1996 and Dec 1998, with equal coverage during all seasons (Figure 151). Mean deployment duration was 13.7 days. Six deployments (2 in 1996, 1 in 1997, and 3 in 1998) were less than 10 days.

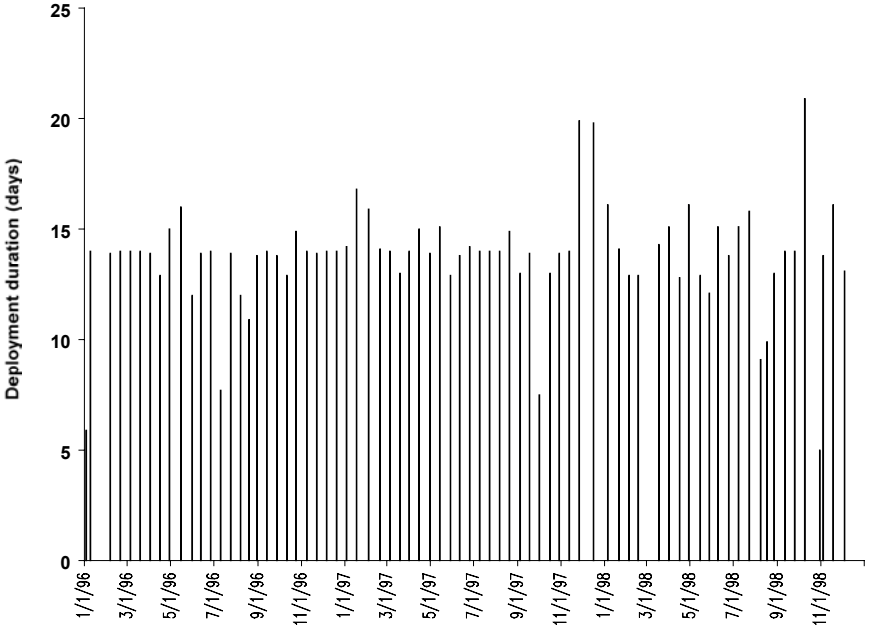



**Figure 151**. Sapelo Island, Marsh Landing deployments (1996-1998).

Forty-four percent of depth data from 1996 were included in analyses; no depth data were collected in 1997 and 1998. The meter probe was suspended from a floating dock at a mean deployment depth of 1.7 m. Scatter plots suggest minor fluctuation (≤ 0.25 m) in depth throughout 1996, except for May and Dec when depth varied 0.5-0.75 m. Because this sensor was suspended from a floating rather than a fixed platform, the depth data were not comparable to data from other sites. Harmonic regression analysis attributed 81% of depth variance to 12.42 hour cycles, 10% of depth variance to 24 hour

cycles, and 9% of depth variance to interaction between 12.42 hour and 24 hour cycles.

Ninety-six percent of annual water temperature data were included in analyses (94% in 1996, 98% in 1997, and 95% in 1998). Water temperature followed a seasonal cycle, with mean water temperatures 11-13°C in winter and 27-29°C in summer (Figure 152). Minimum and maximum water temperatures between 1996-1998 were 7.3°C (Jan 1996) and 31.7°C (Jul 1998), respectively. Scatter plots suggest moderate fluctuations (≤ 2°C) in daily water temperature and strong fluctuations (≤ 7°C) in bi-weekly water temperature throughout the data set. Harmonic regression analysis attributed 37% of temperature variance to 12.42 hour cycles, 35% of temperature variance to 24 hour cycles, and 28% of temperature variance to interaction between 12.42 hour and 24 hour cycles.

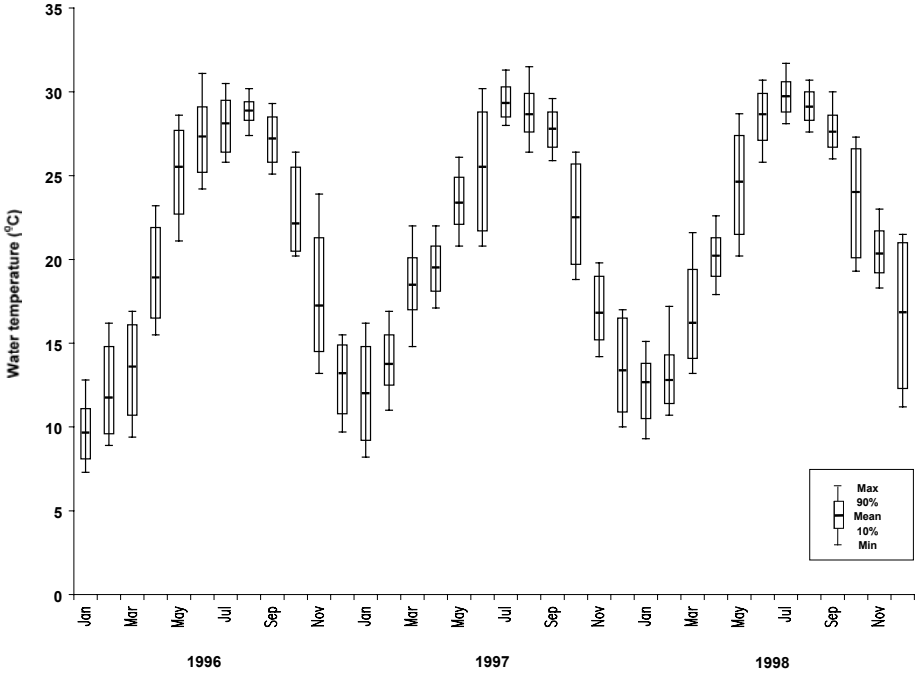



**Figure 152**. Water temperature statistics at Marsh Landing, 1996-1998.

Ninety-six percent of annual salinity data were included in analyses (94% in 1996, 98% in 1997, and 95% in 1998). Mean salinity followed a seasonal cycle, with lowest salinity in winter and greatest salinity in summer (Figure 153). Mean winter salinity in 1998 (10-15 ppt) was much lower than mean winter salinity in 1996-1997 (20-25 ppt) and was probably related to increased precipitation and runoff during the 1998 El Nino winter. Mean salinity in summer was similar in all three years (25-30 ppt). Minimum and maximum salinity between 1996-1998 was 1.8 ppt (Feb 1998) and 37.5 ppt (May 1996), respectively. Scatter plots suggest strong fluctuations (≤ 5 ppt) in daily salinity and even stronger fluctuations (≤ 10 ppt) in bi-weekly salinity in summer and fall. Strongest fluctuations (> 10 ppt) in bi-weekly salinity were observed in winter and spring. Harmonic regression analysis attributed 74% of salinity variance to 12.42 hour cycles, 14% of salinity variance to interaction between 12.42 hour and 24 hour cycles, and 12% of salinity variance to 24 hour cycles.

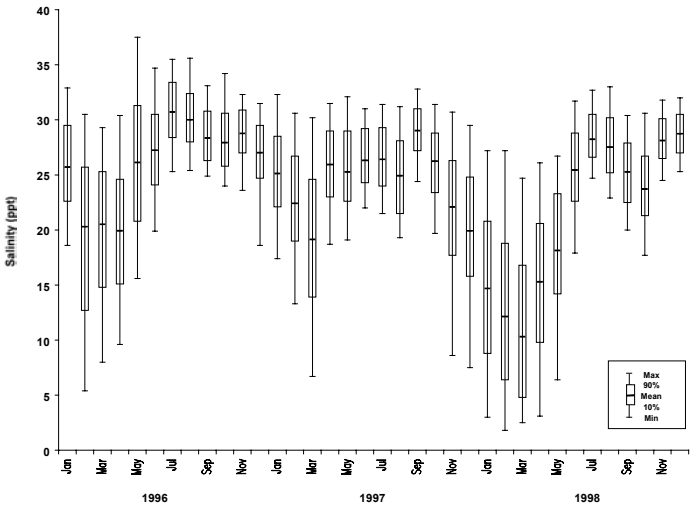



**Figure 153**. Salinity statistics at Marsh Landing, 1996-1998.

Eighty percent of annual dissolved oxygen (% saturation) data were included in analyses (76% in 1996, 94% in 1997, and 69% in 1998). Mean DO ranged from 64-109% saturation throughout the data set and followed a seasonal cycle. Mean DO was lowest in summer 1996-1997 (64-78% sat); however, mean DO was atypically elevated in Jun-Aug 1998 (87-98% sat). Mean DO in winter 1997-1998 was 72-94% saturation, substantially less than winter 1996 (103-109% sat). Minimum and maximum DO between 1996-1998 was 3.3% saturation (Sep 1998) and 179.5% saturation (Jul 1998), respectively. Persistent hypoxia was never observed (Figure 154). Supersaturation was observed in five months (May-Jun, Nov 1996; Nov 1997, and May 1998) and, when present, supersaturation persisted for 8.4% of the first 48 hours post-deployment on average. Scatter plots suggest moderate fluctuations (20-60%) in percent saturation throughout the data set. Harmonic regression analysis attributed 52% of DO variance to 12.42 hour cycles, 19% of DO variance to 24 hour cycles, and 29% of DO variance to interaction between 12.42 hour and 24 hour cycles.

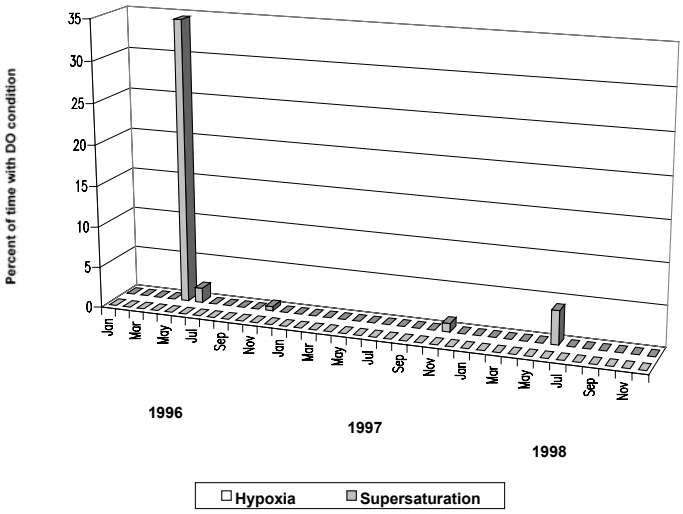



**Figure 154**. Dissolved oxygen extremes at Flume Dock, 1996-1998.