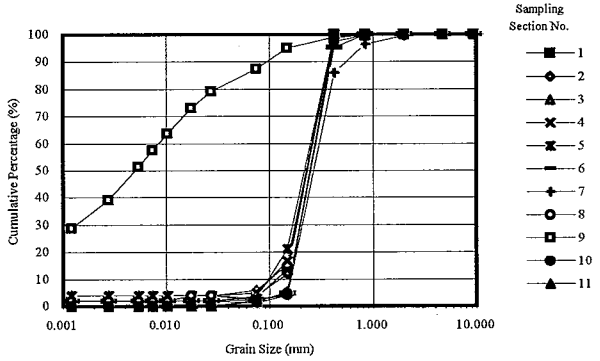
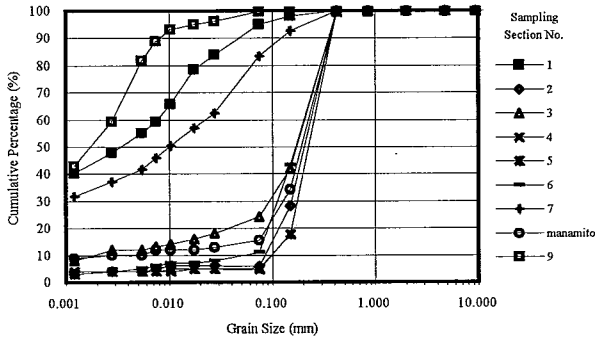
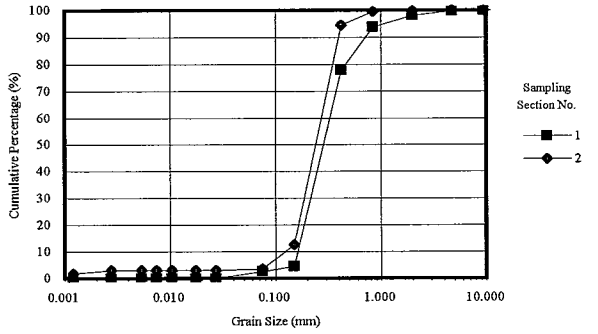
Grain Size Distributions in Macareo Channel
December 1998



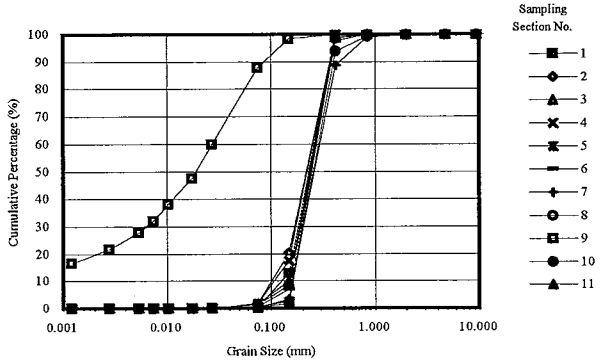
Grain Size Distributions in Manamo Channel
December 1998



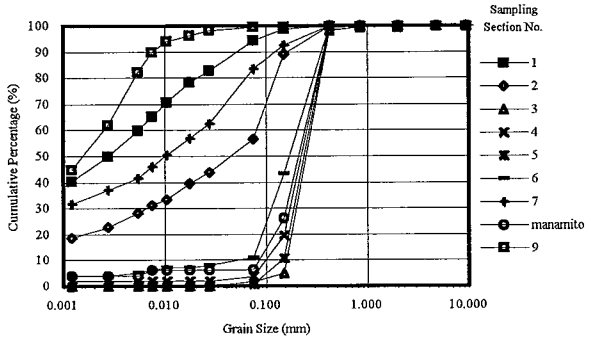
Grain Size Distributions in Orinoco Channel
December 1998



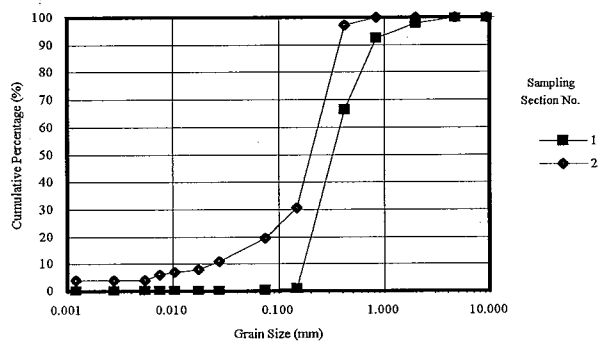
Grain Size Distributions in Macareo Channel
January 1999



Grain Size Distributions in Manamo Channel
January 1999



Grain Size Distributions in Orinoco Channel
January 1999



Source:JICA 1999

Fig. 3-2-24 **Grading Curves of Riverbed Material of Manamo, Macareo and Rio Grande Channels**

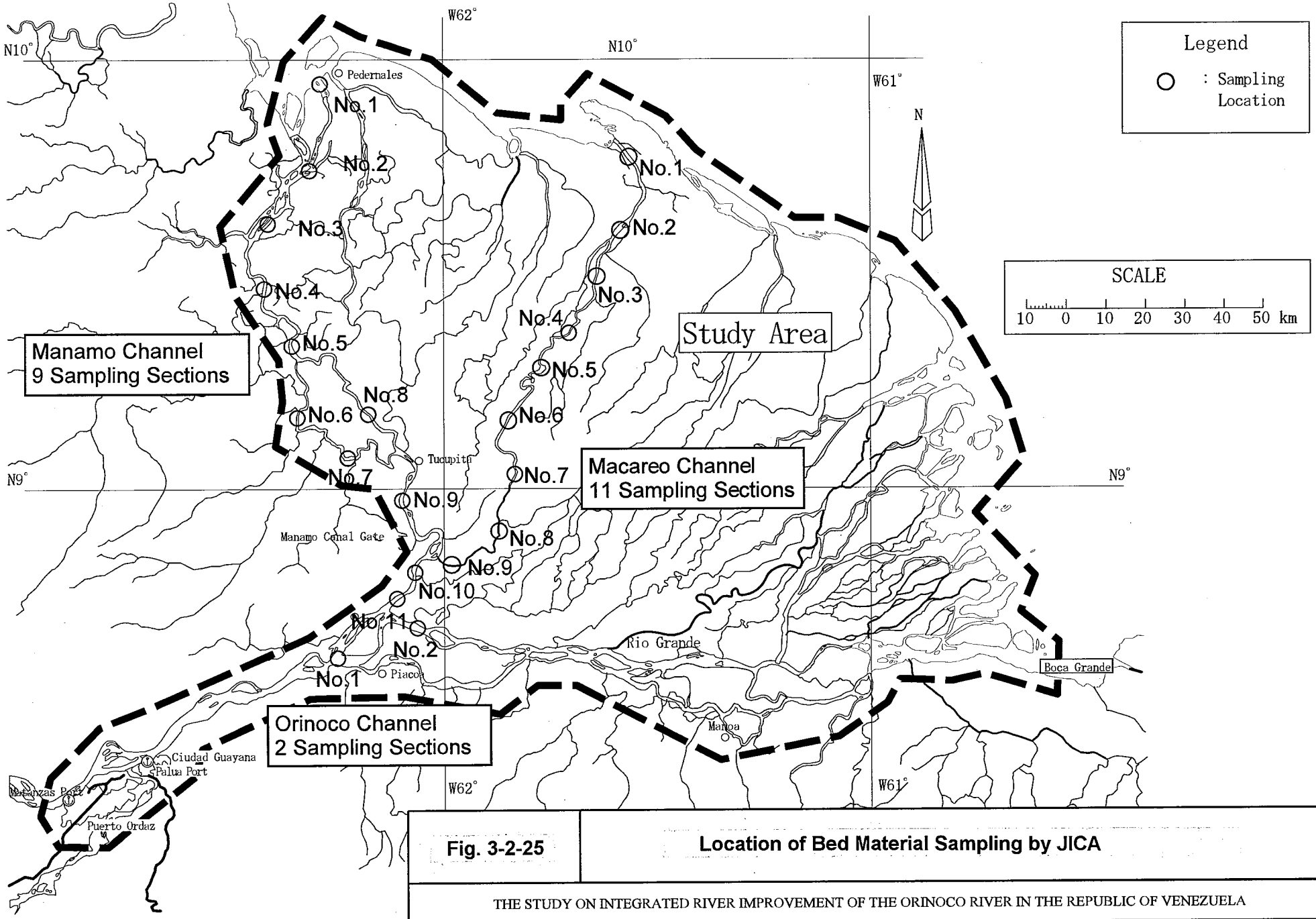
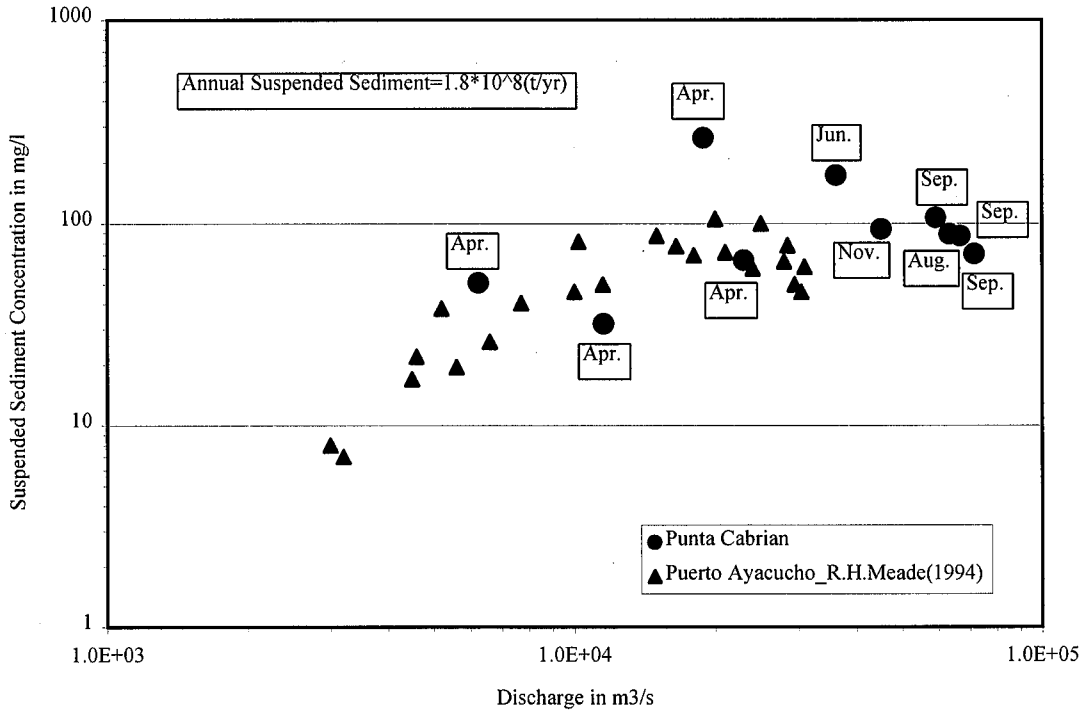


Fig. 3-2-25 **Location of Bed Material Sampling by JICA**

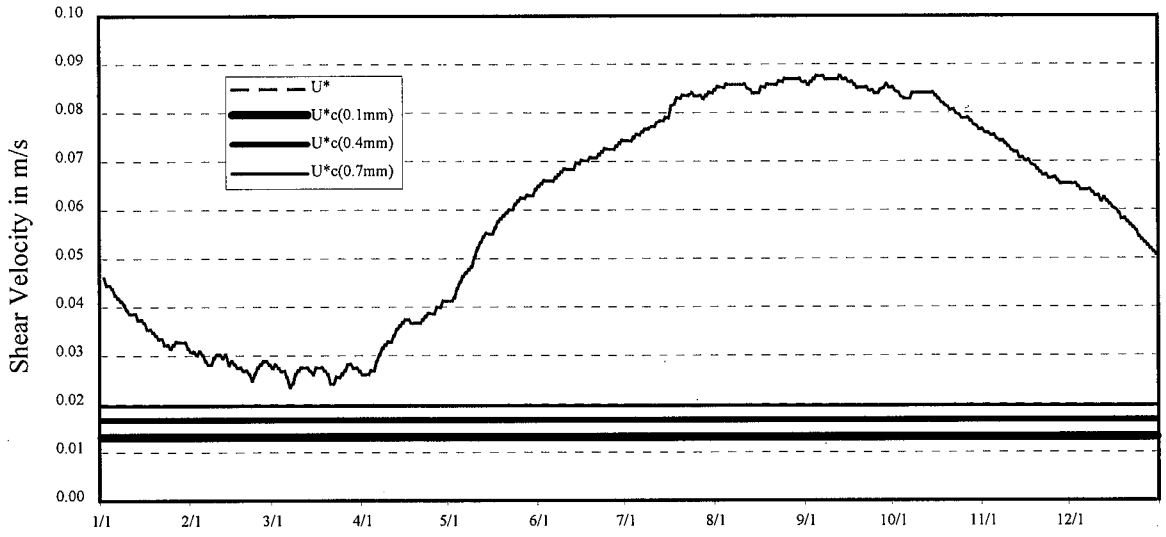
RELATION BETWEEN SUSPENDED SEDIMENT AND WATER DISCHARGE AT P. CABRIAN
(1993-1997 Measurement by INC-MARNR)



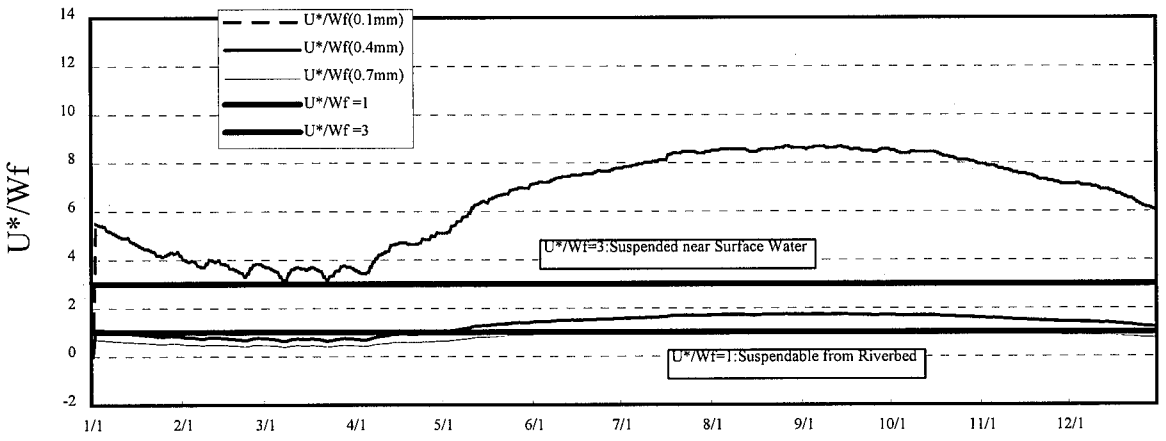
source:R.H.Meade, Suspended Sediments of the Modern Amazon and Orinoco River

Fig. 3-2-26 Relation Between Suspended Sediment and Water Discharge

Shear Velocity and Critical Shear Velocity



270km(Guarguapo-Barrancas)



90km(Noina)

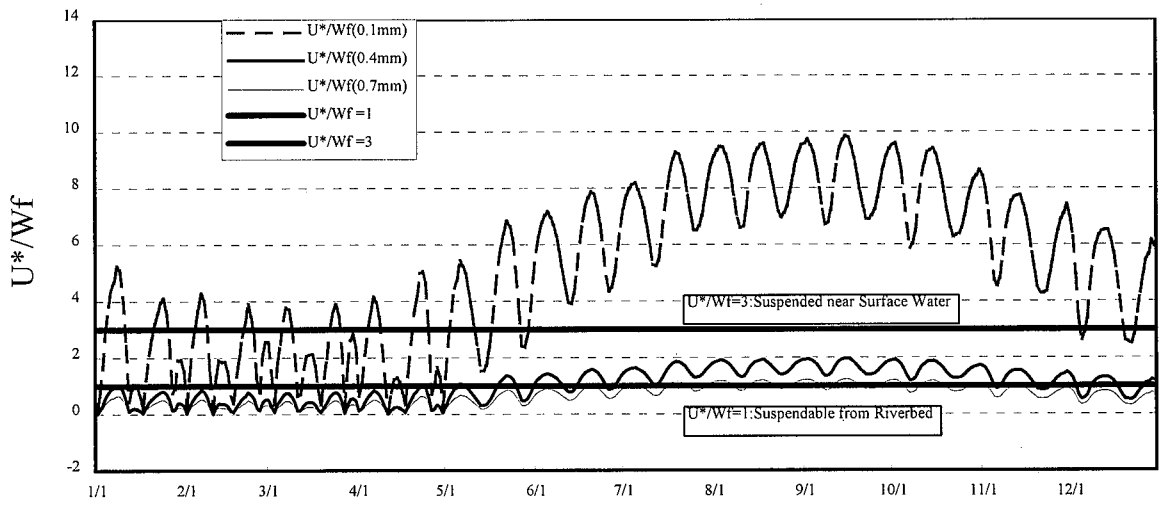
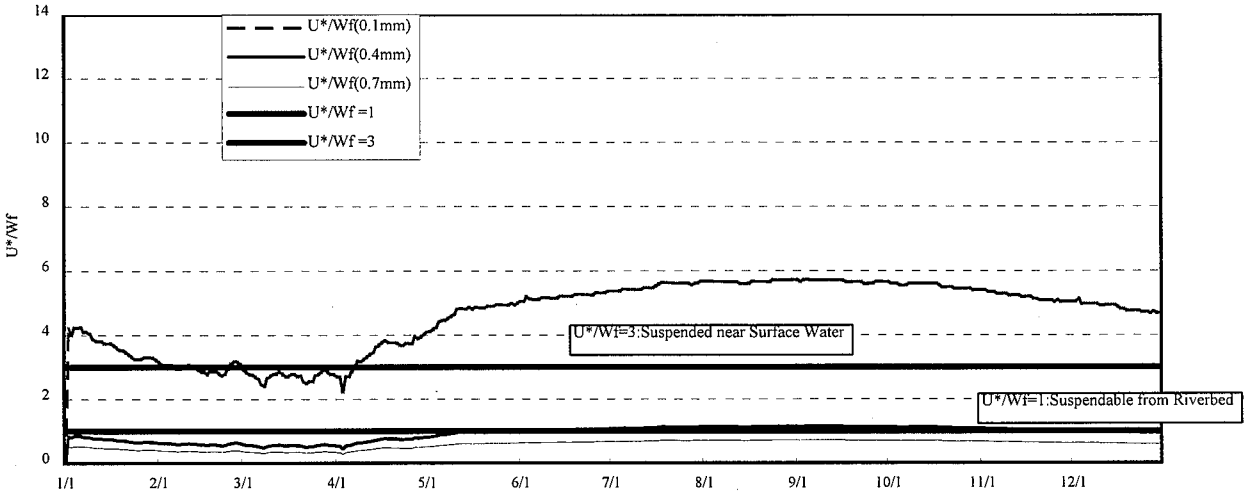


Fig. 3-2-27 Annual Variation of Ratio of Shear Velocity to Falling Velocity (1/2)

Macareo Channel(185km)



Manamo Channel(170km)

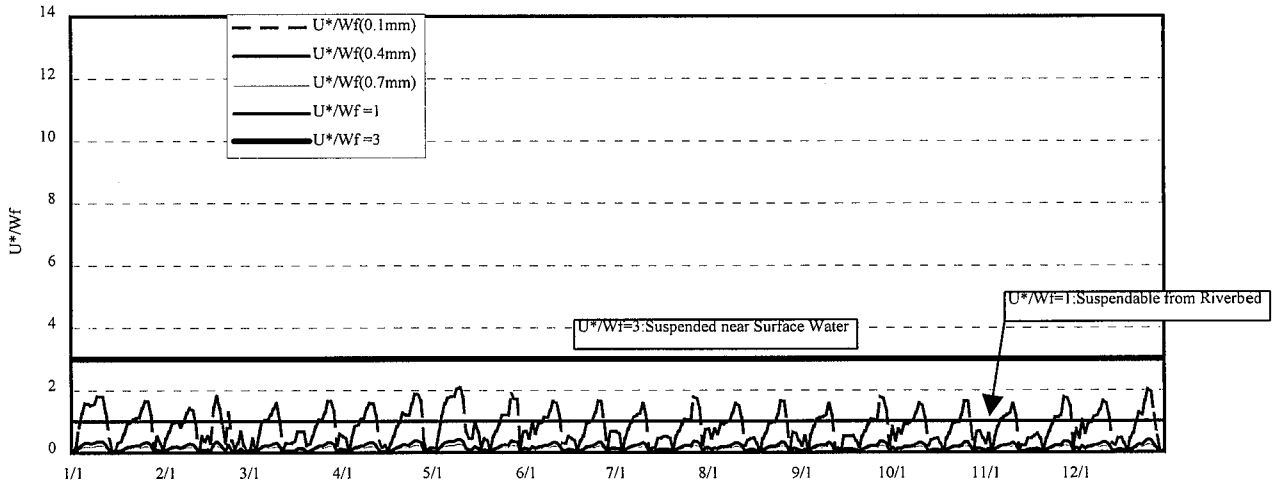
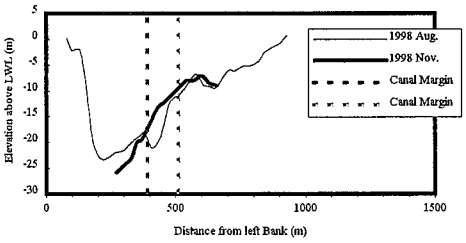
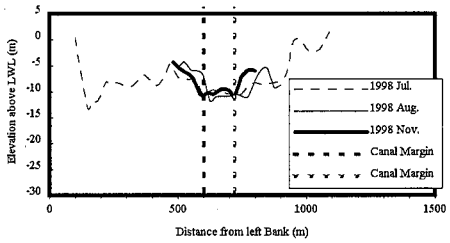


Fig. 3-2-27 Annual Variation of Ratio of Shear Velocity to Falling Velocity (2/2)

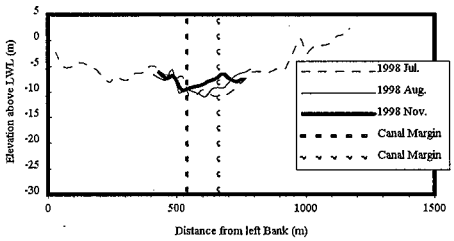
Cross section at 271.0km



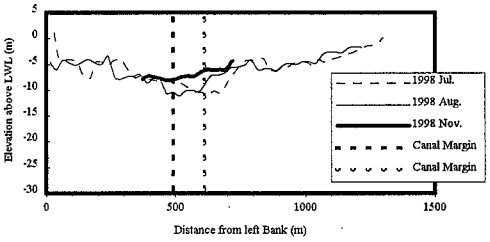
Cross section at 271.5km



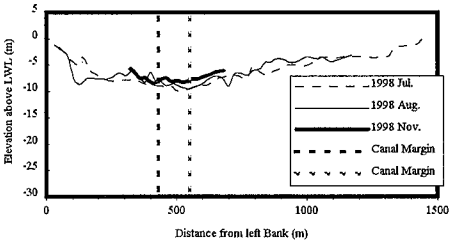
Cross section at 272.0km



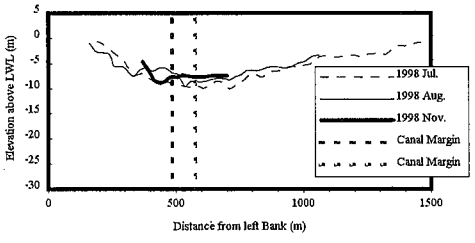
Cross section at 272.5km



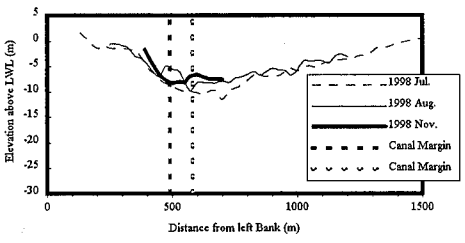
Cross section at 273.0km



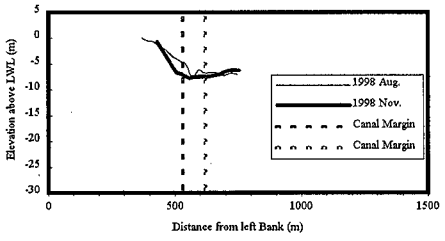
Cross section at 273.5km



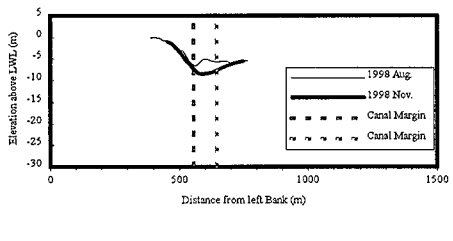
Cross section at 274.0km



Cross section at 274.5km



Cross section at 275.0km



Cross section at 275.5km

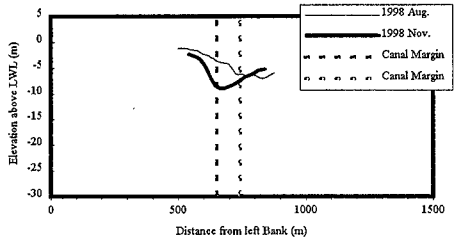
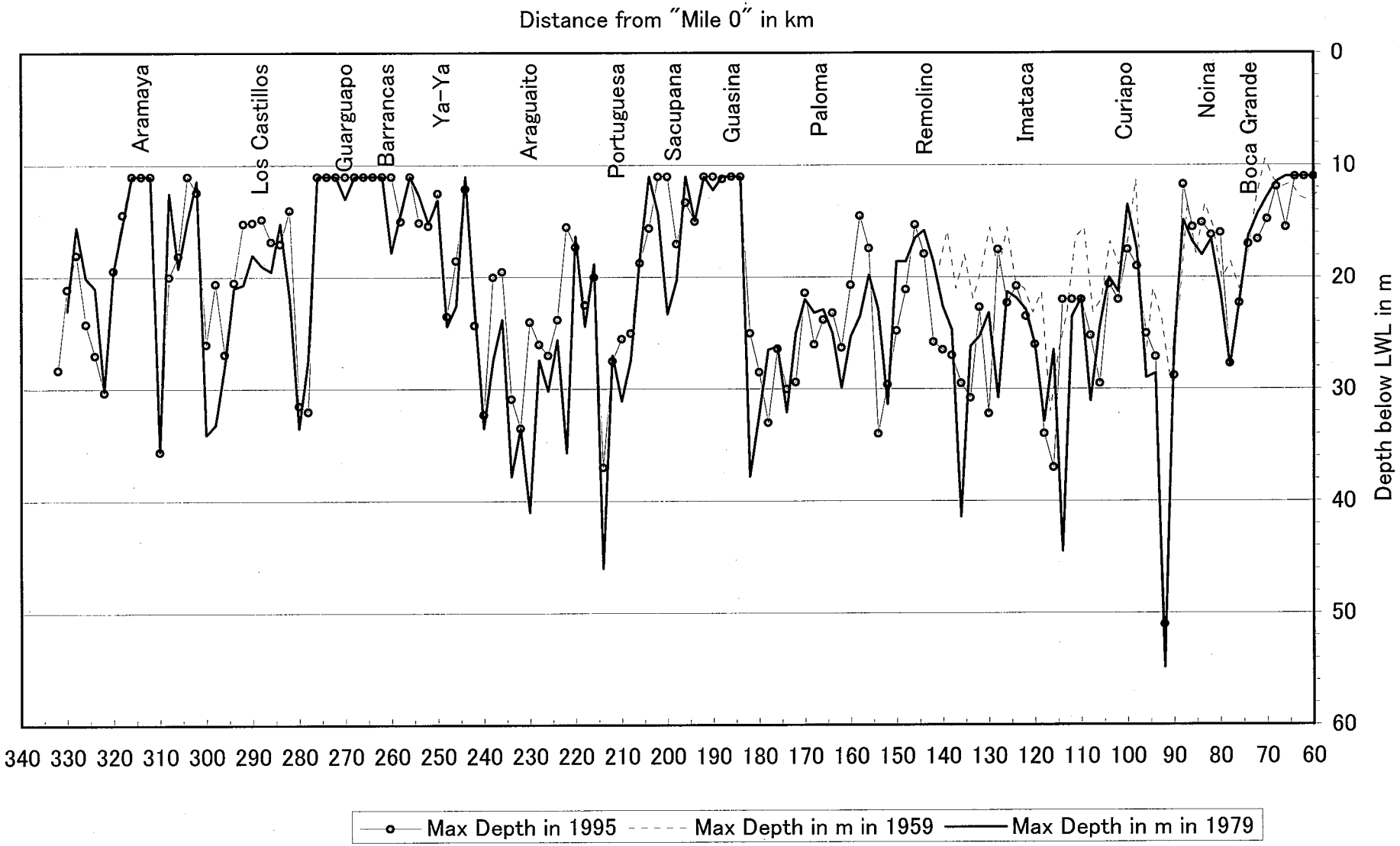


Fig. 3-2-28 Cross Section Change of Guarguapo Section



Source: Navigation Charts of 1995, 1979 and 1959 by INC

Fig. 3-2-29 Comparison of Longitudinal Profiles of Rio Grande Channel

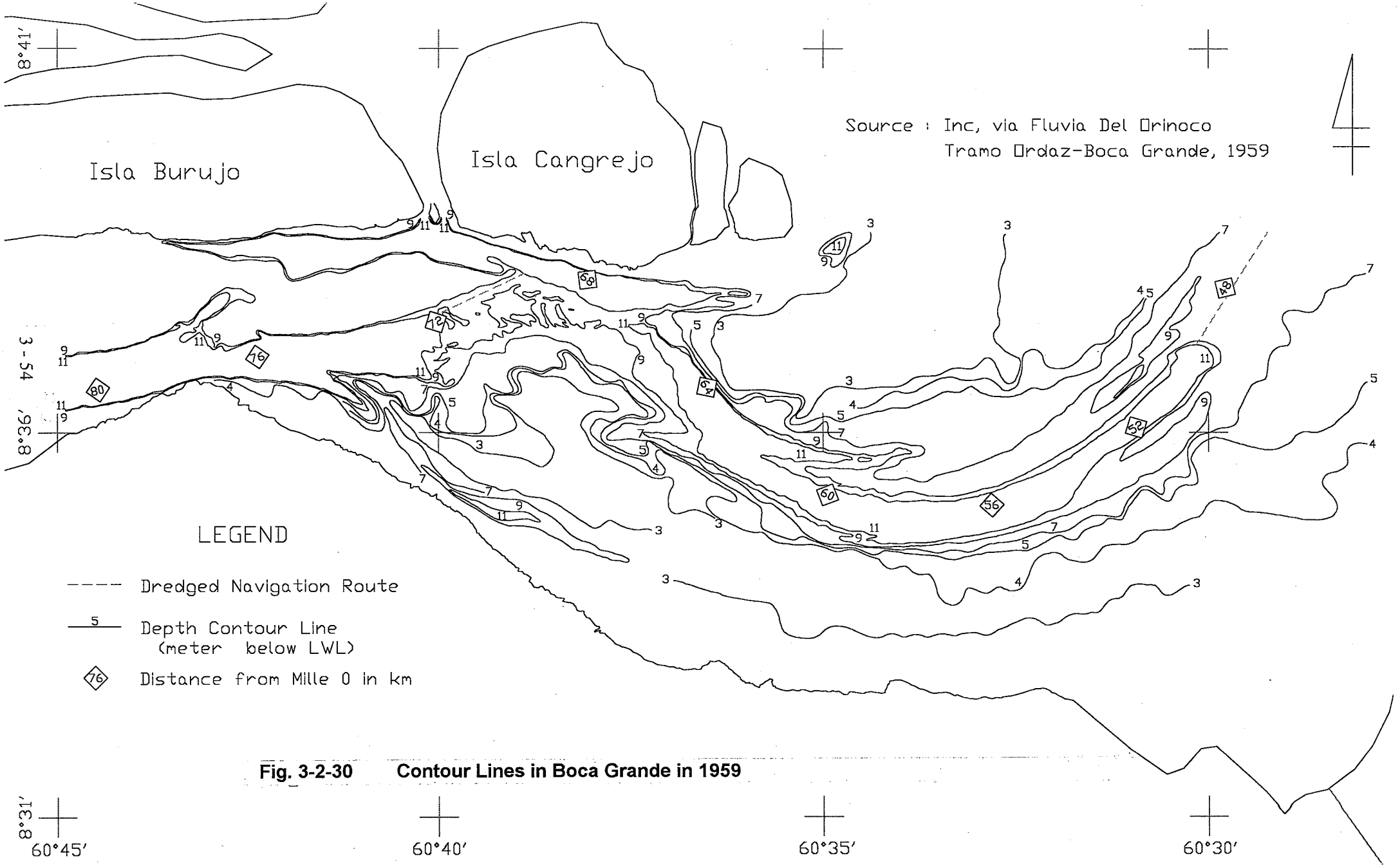


Fig. 3-2-30 Contour Lines in Boca Grande in 1959

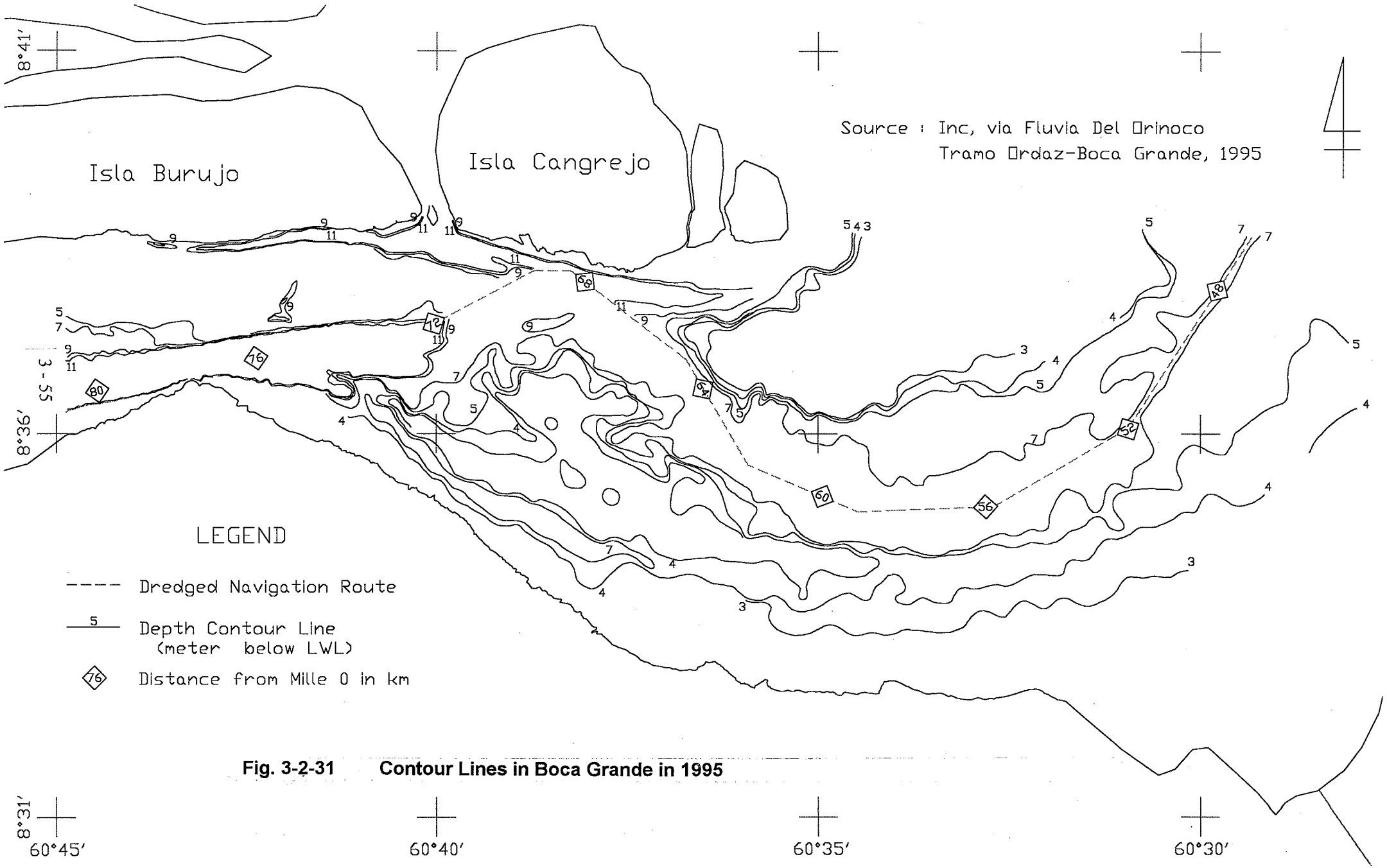
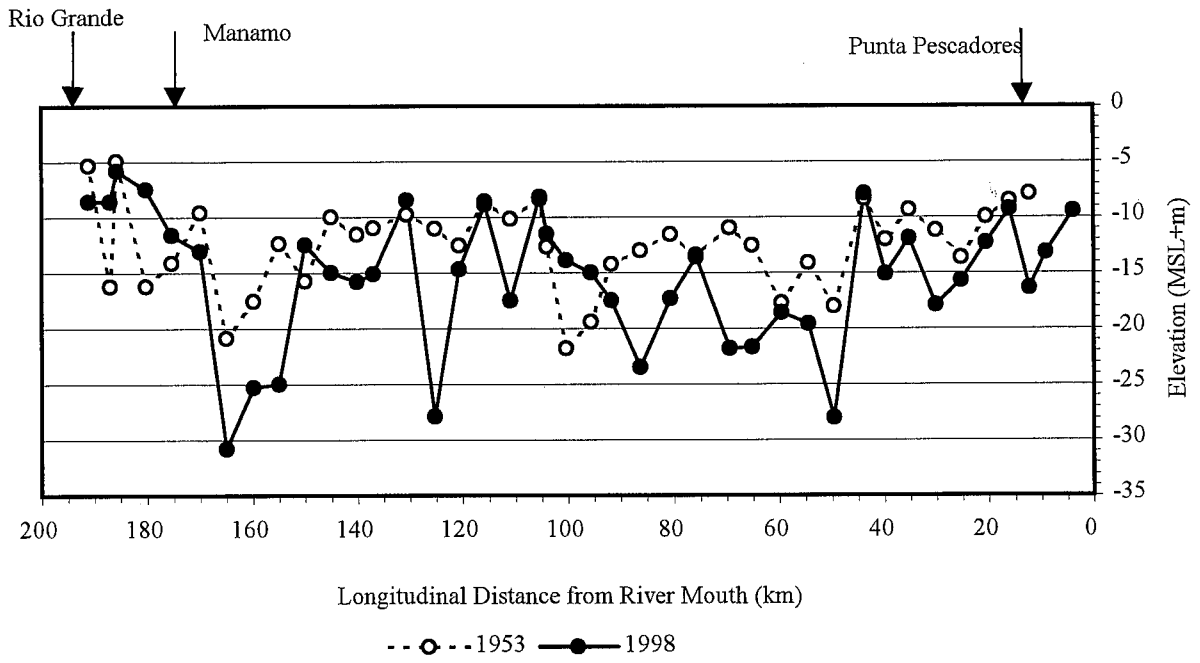
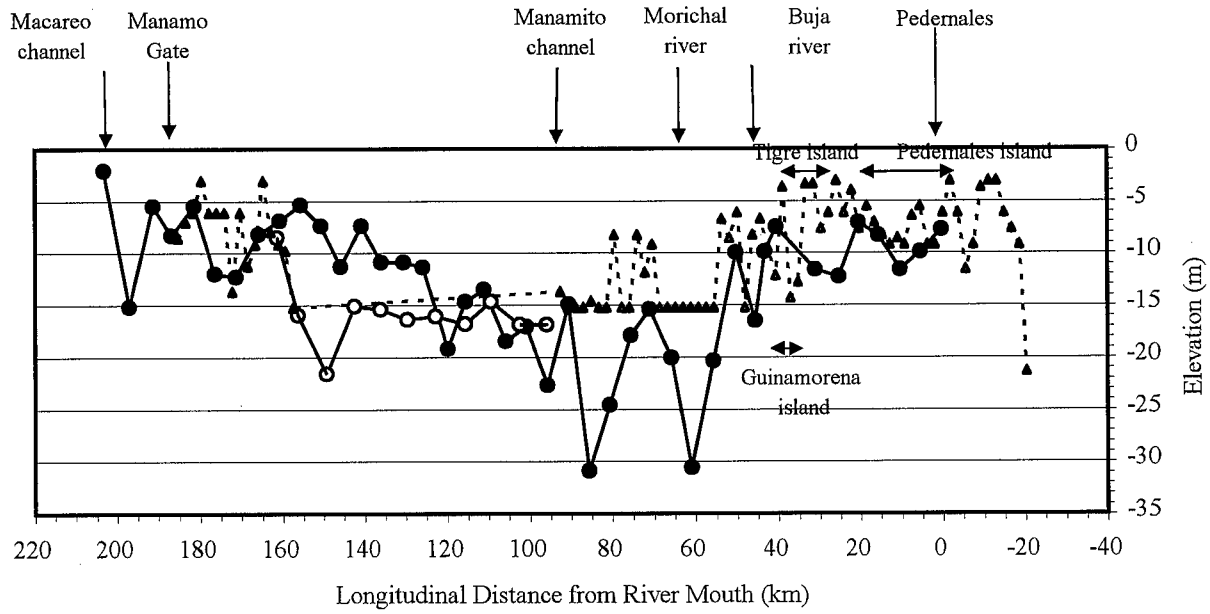


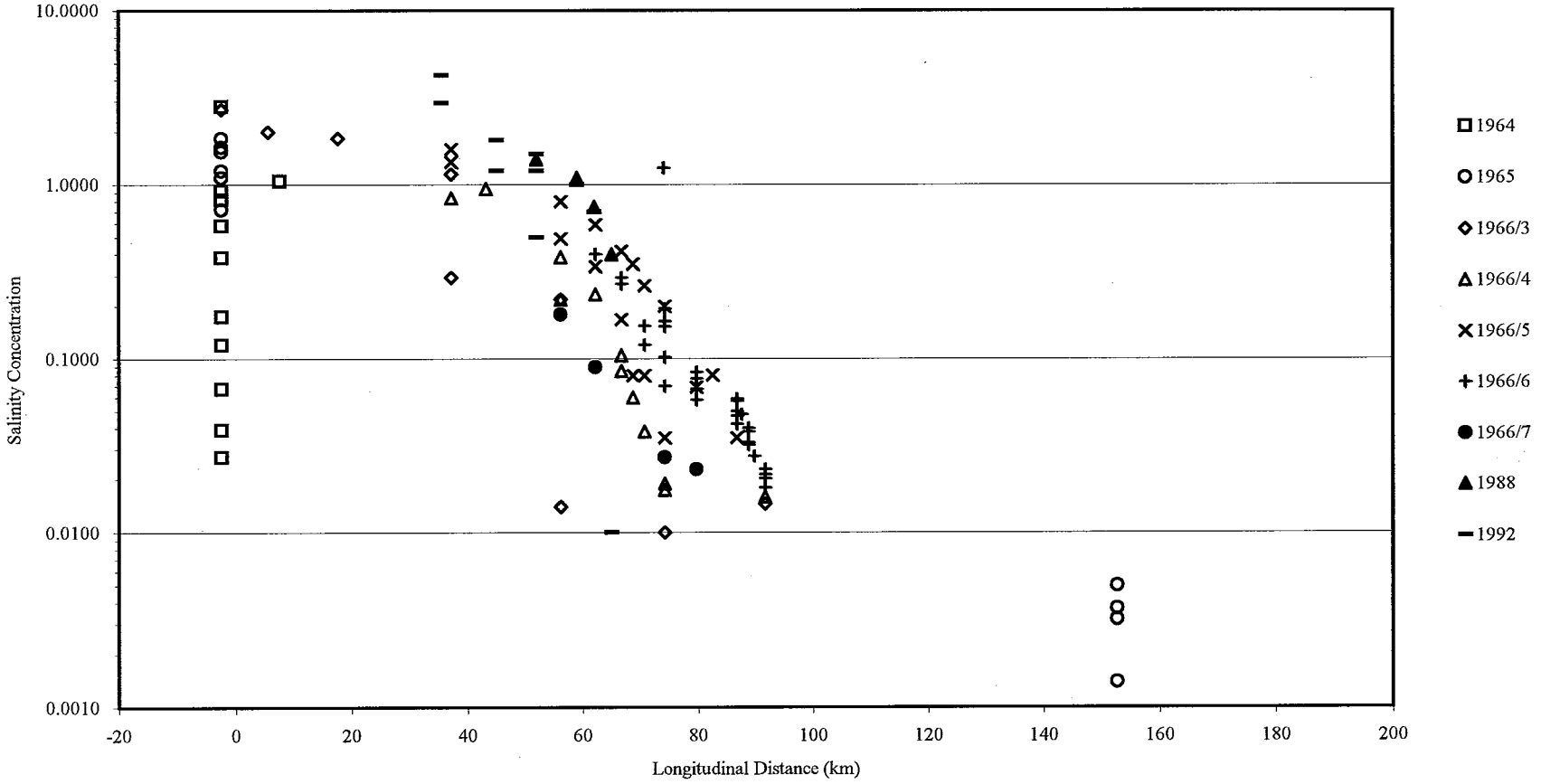
Fig. 3-2-31 Contour Lines in Boca Grande in 1995





Manamo channel — Manamito channel - - - MANAMO(1960 TAMS)

Fig. 3-2-32 **Longitudinal Profile Variations of Macareo and Manamo Channels**



Source: IV-11 Average Salinity Measurements, Preliminary Report Orinoco Delta Project, CVG, July 1966

Fig. 3-2-33	Longitudinal Profile of Salinity Concentration in Manamo Channel (1964 - 1992)
THE STUDY ON INTEGRATED RIVER IMPROVEMENT OF THE ORINOCO RIVER IN THE REPUBLIC OF VENEZUELA	

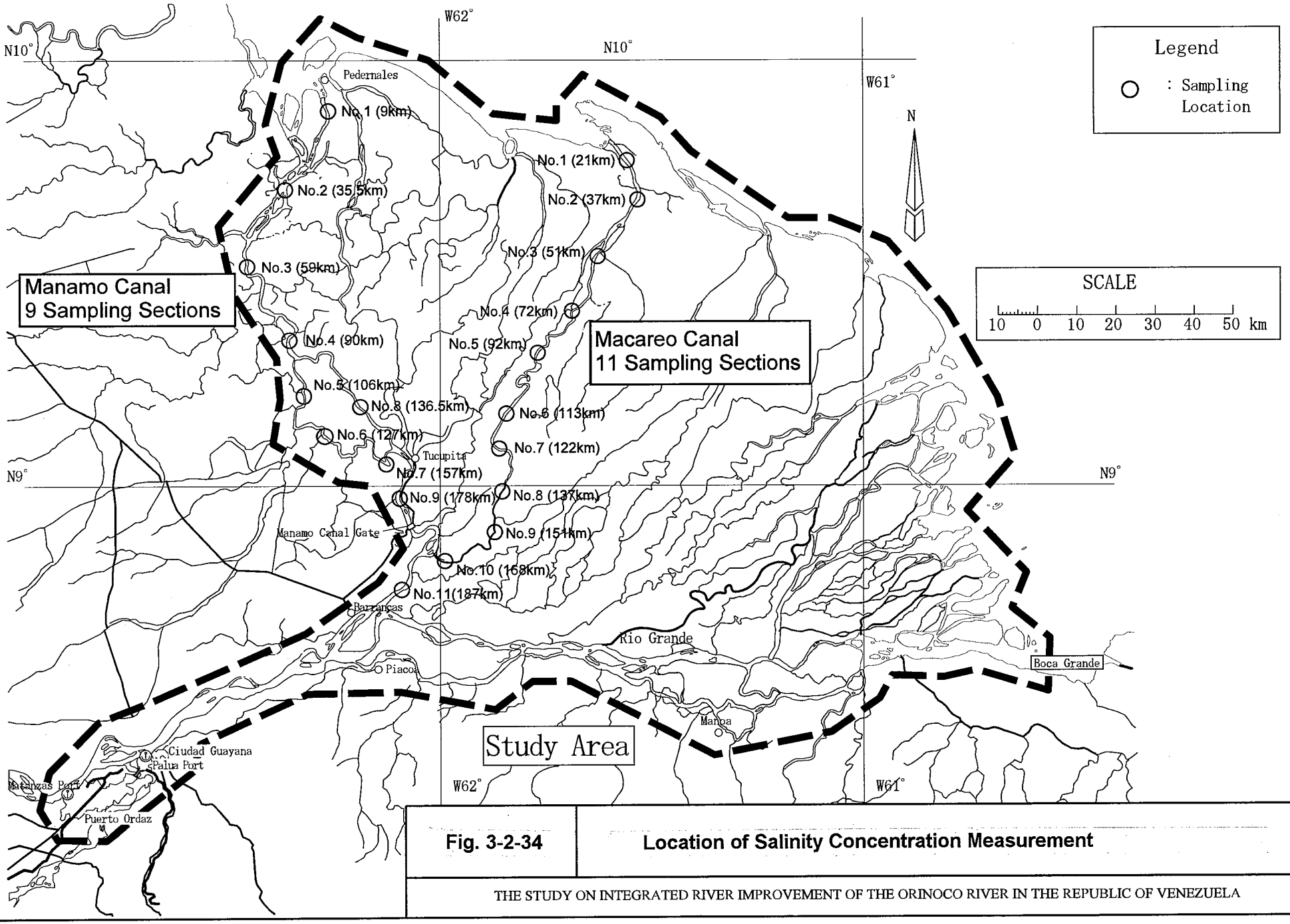


Fig. 3-2-34 **Location of Salinity Concentration Measurement**

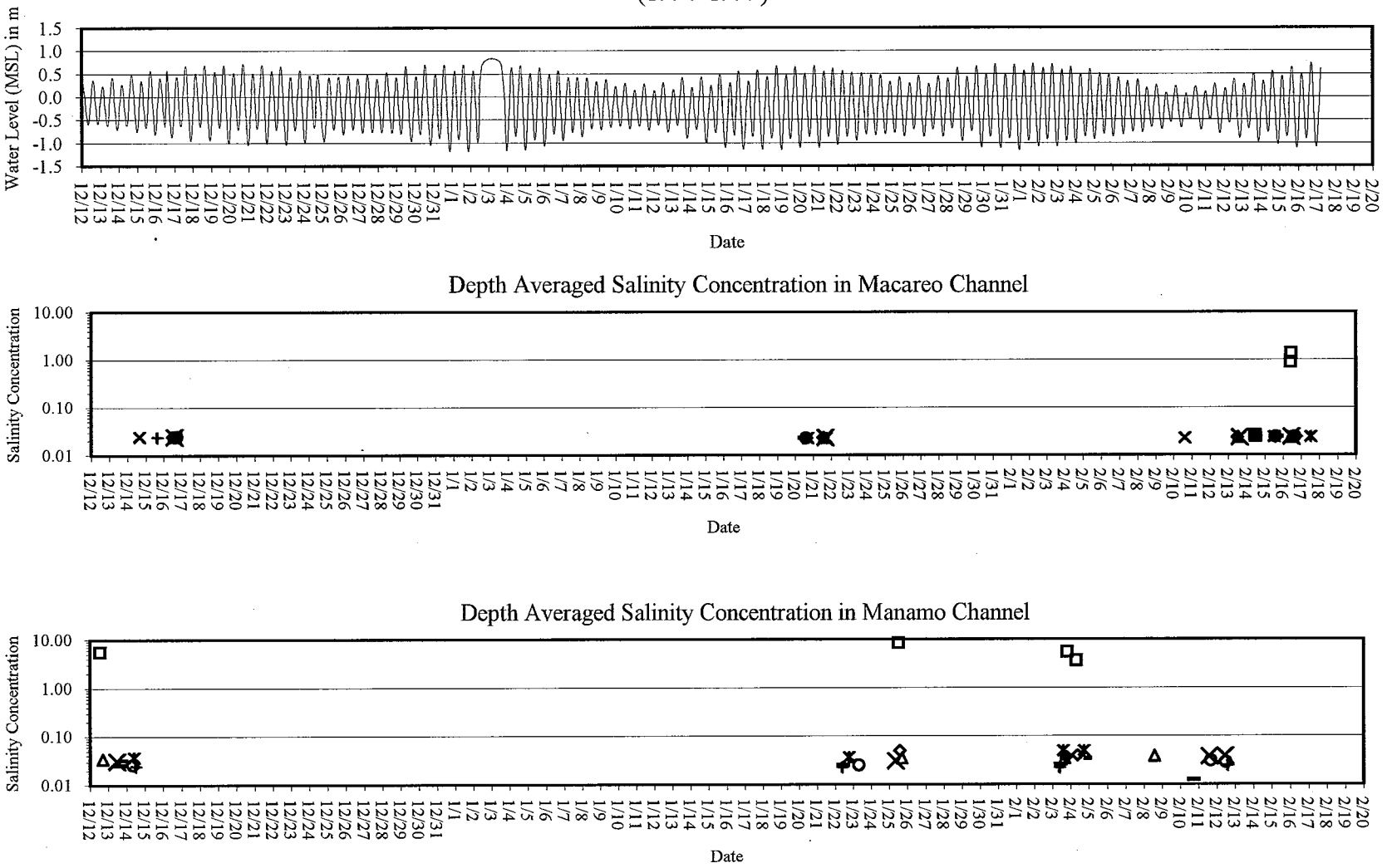
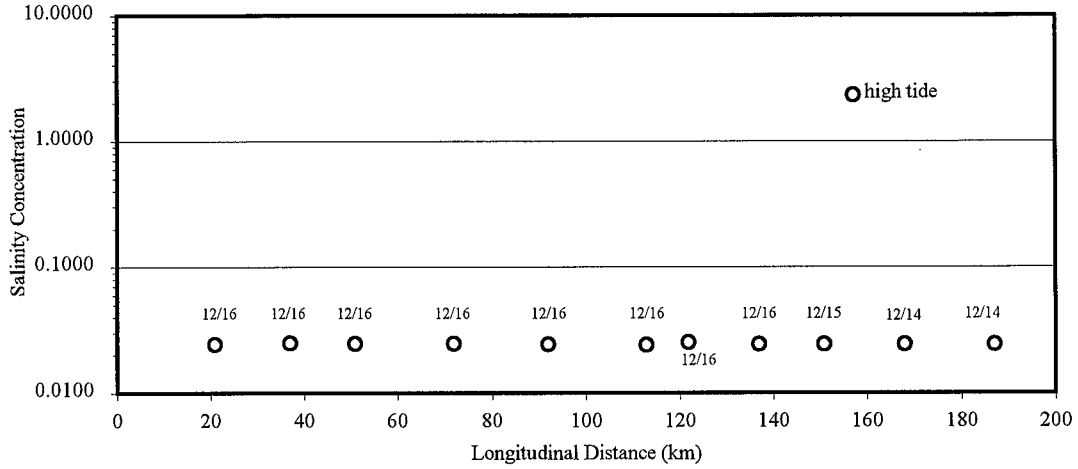


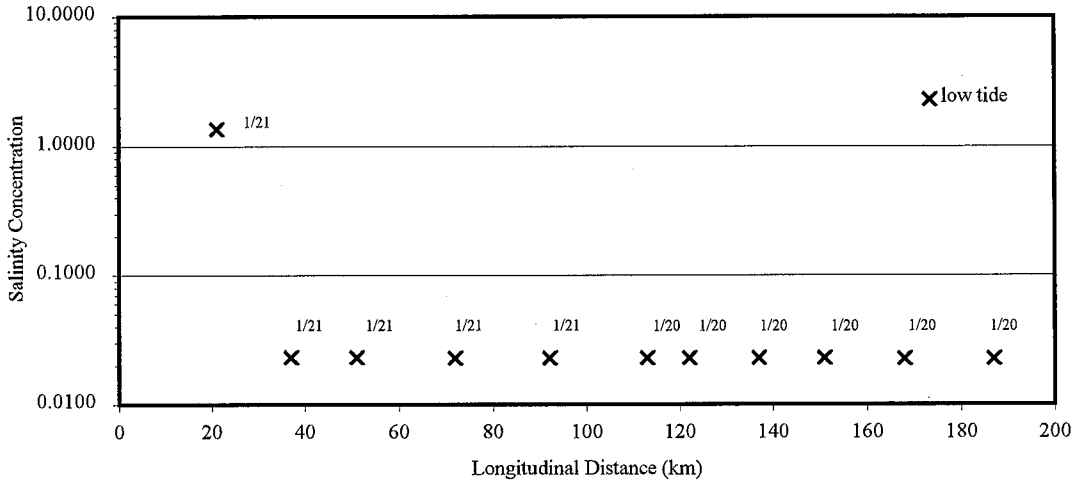
Fig. 3-2-35 **Time Series of Depth Averaged Salinity Concentration in Macareo and Manamo Channels**

THE STUDY ON INTEGRATED RIVER IMPROVEMENT OF THE ORINOCO RIVER IN THE REPUBLIC OF VENEZUELA

December 1998



January 1999



February 1999

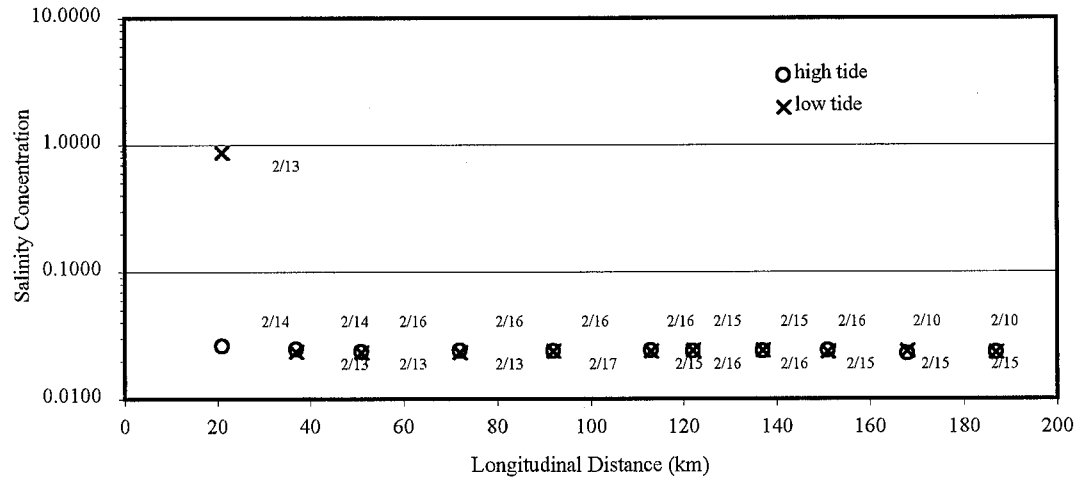
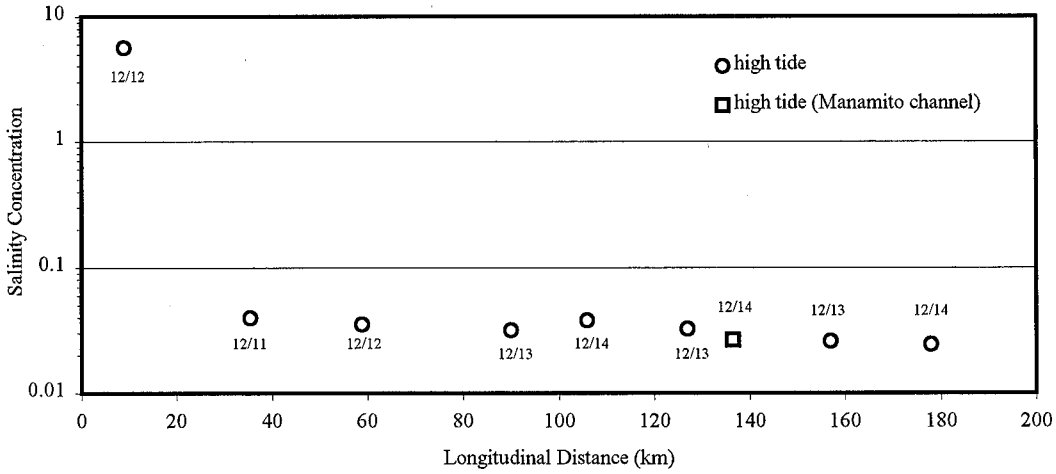
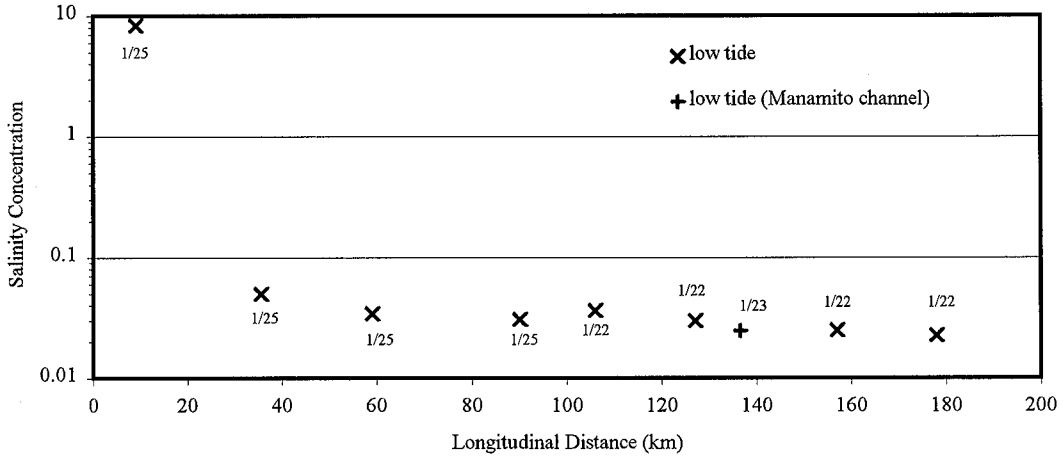


Fig. 3-2-36 **Longitudinal Profile of Salinity Concentration in Macareo Channel**

December 1998



January 1999



February 1999

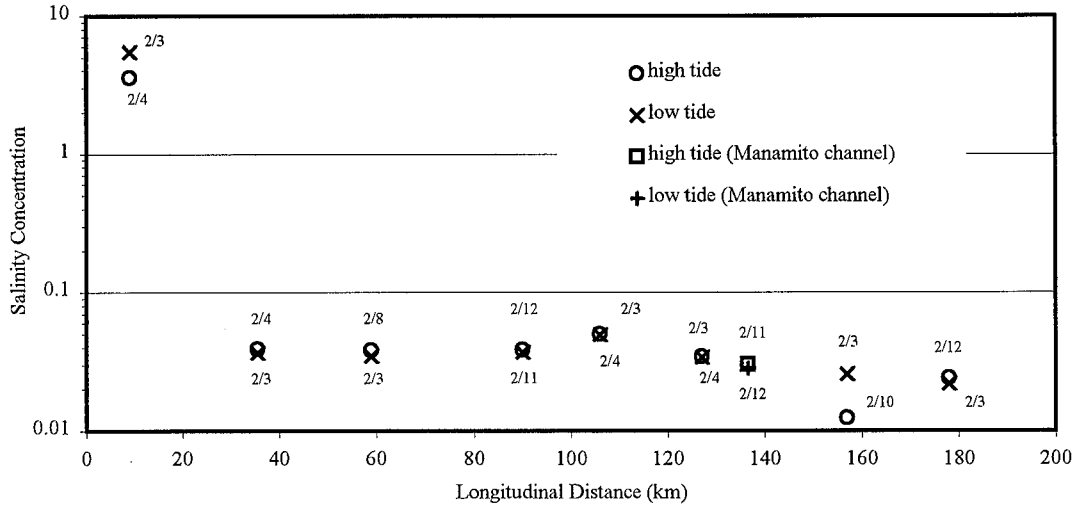
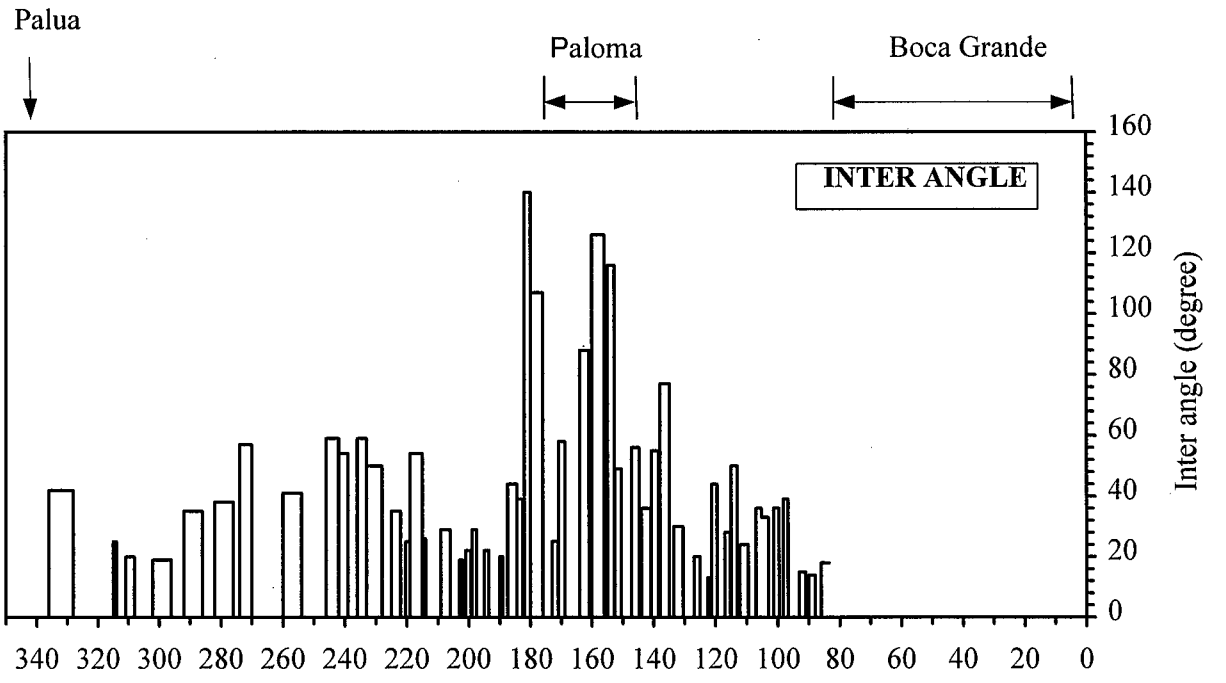
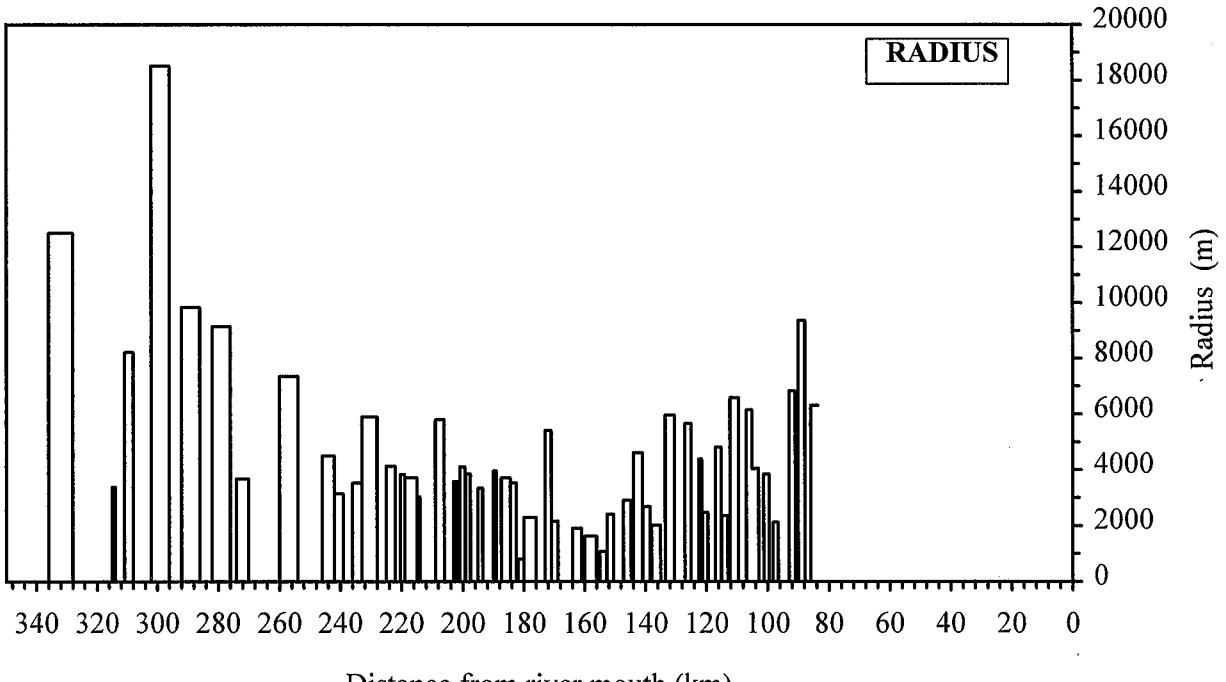


Fig. 3-2-37 **Longitudinal Profile of Salinity Concentration in Manamo Channel**





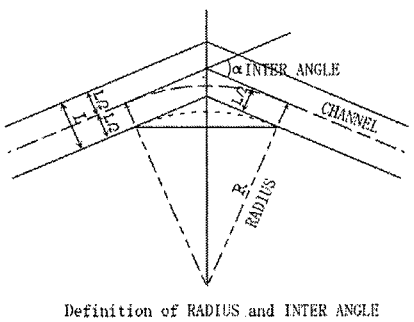
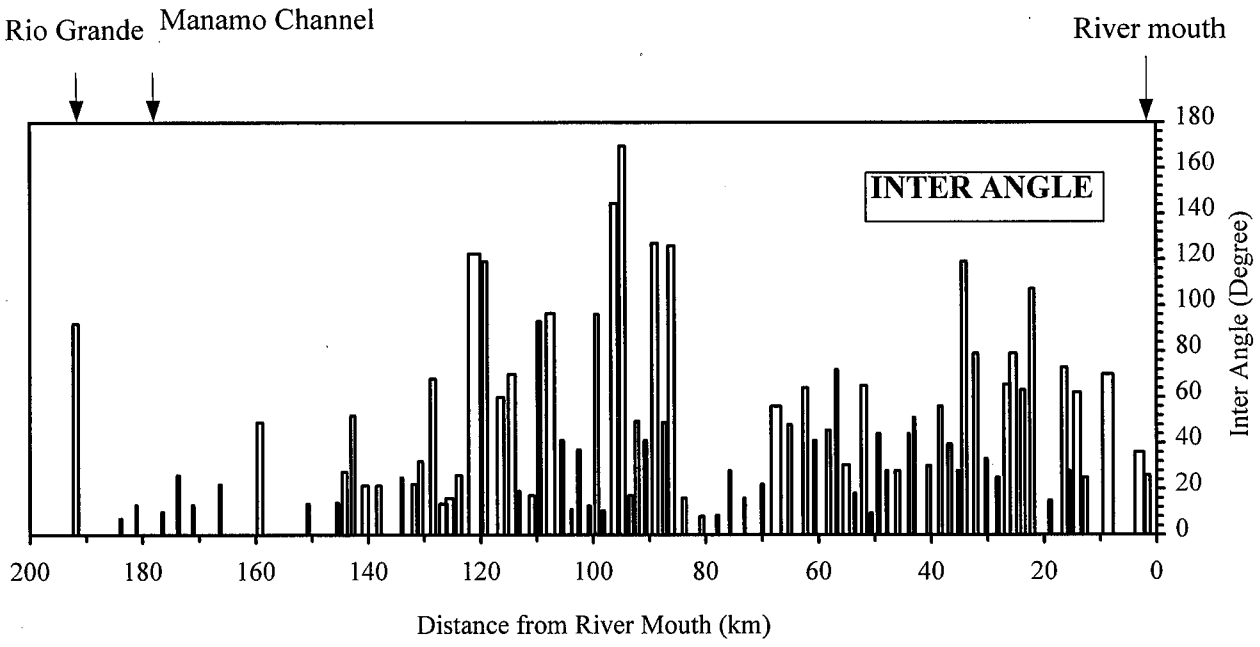


Fig. 3-2-38 **Inter Angle and Radius of Rio Grande Channel**



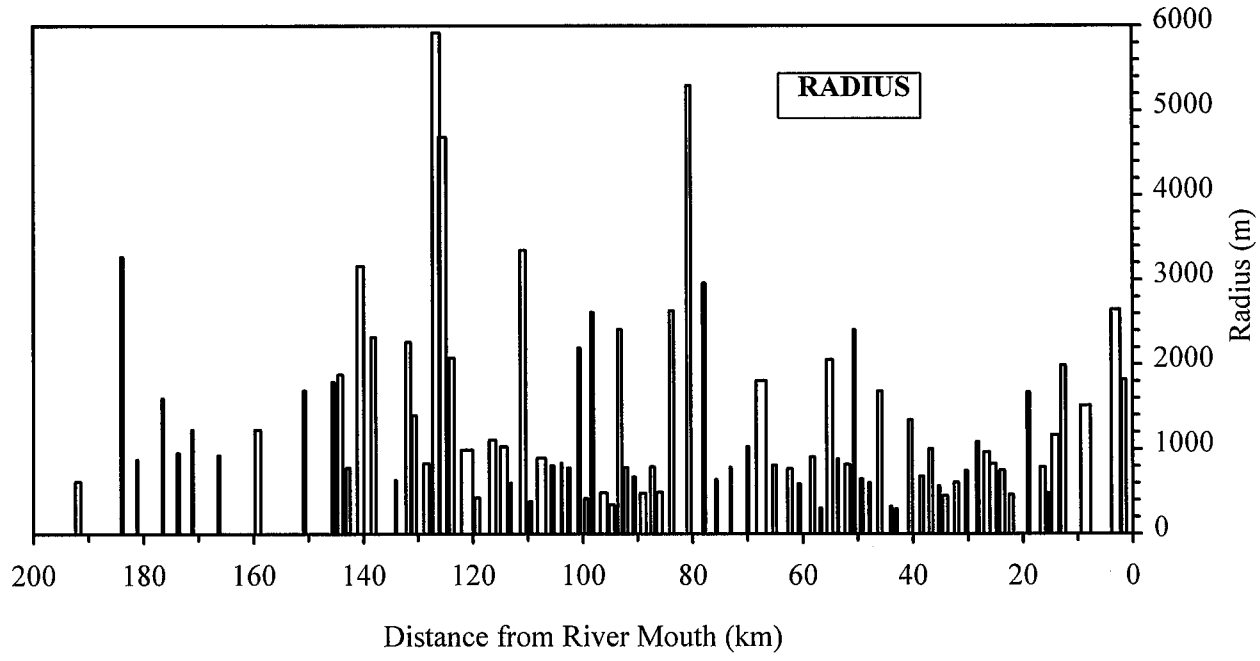
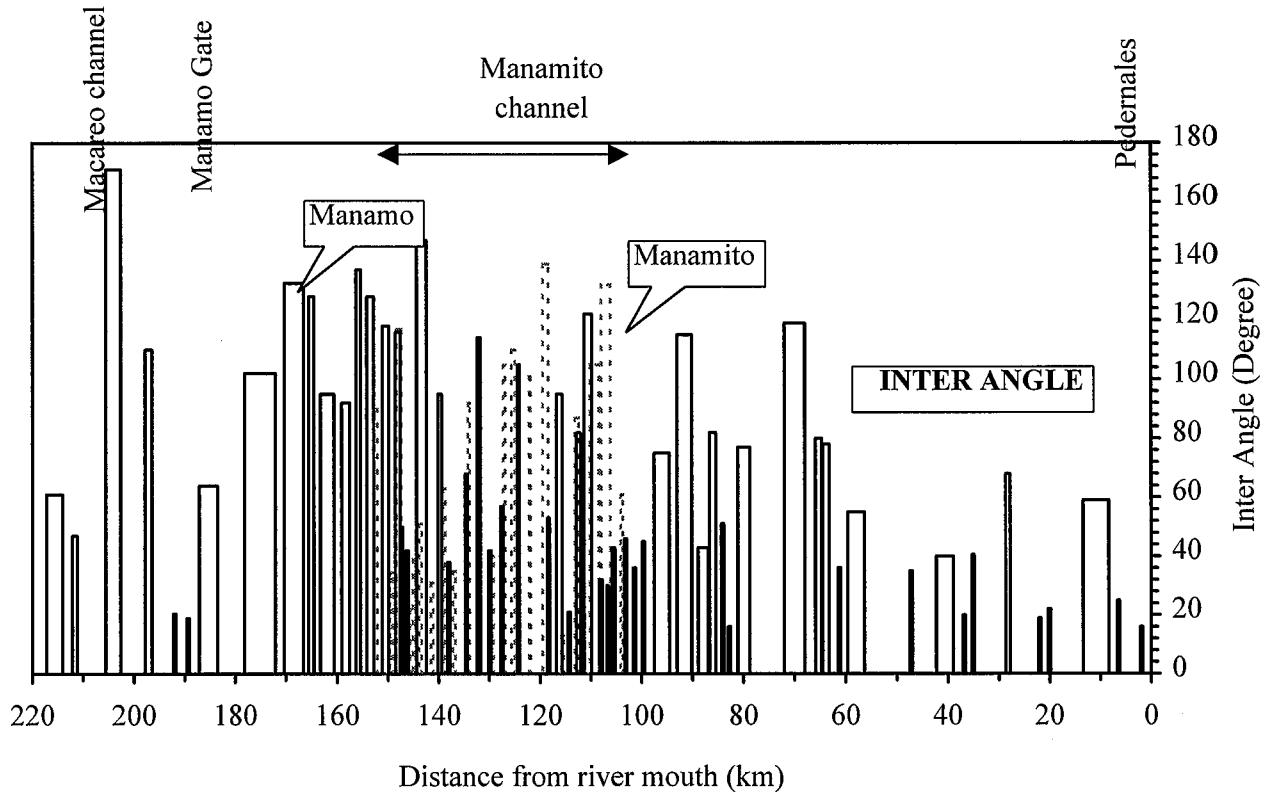


Fig. 3-2-39	Inter Angle and Radius of Macareo Channel



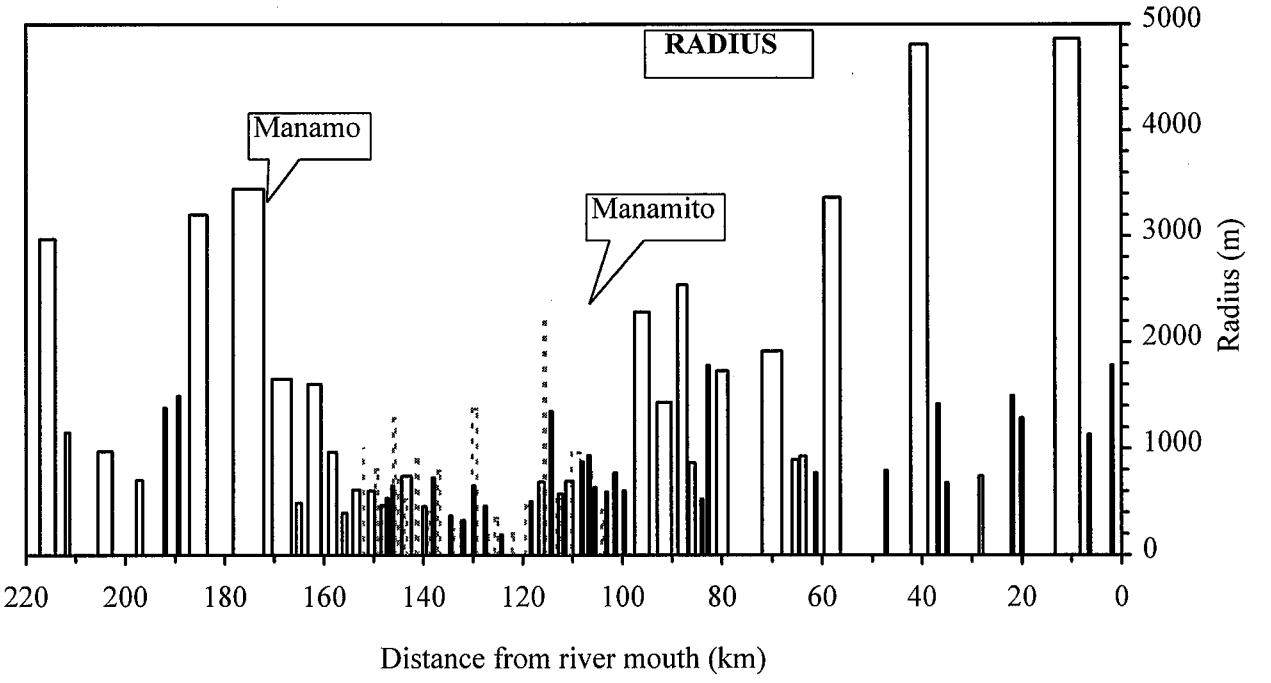
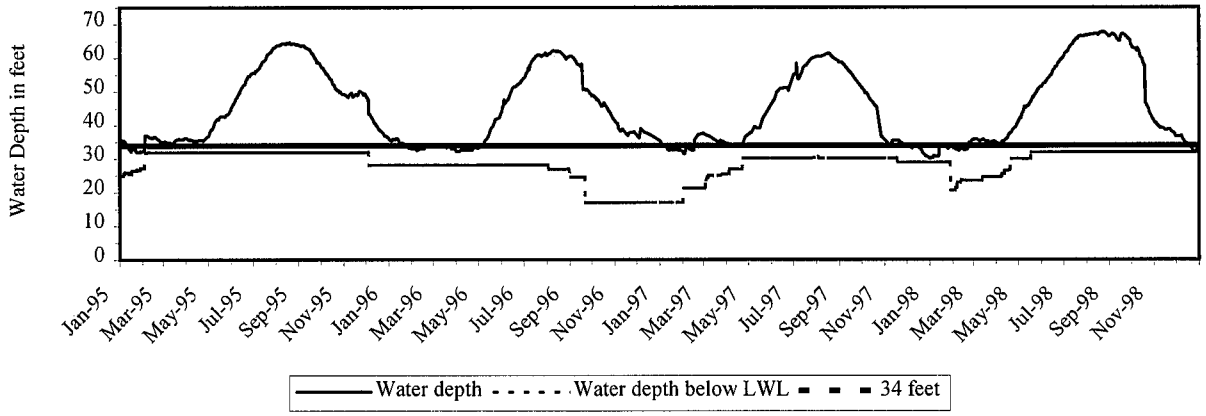
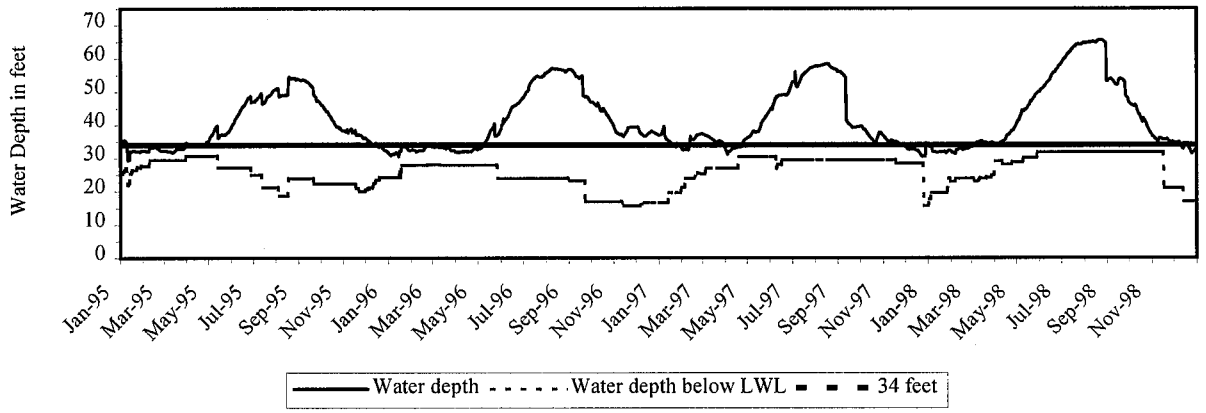


Fig.3-2-40	Inter Angle and Radius of Manamo Channel

SAN FELIX SECTION



ARAMAYA SECTION



GUARGUAPO SECTION

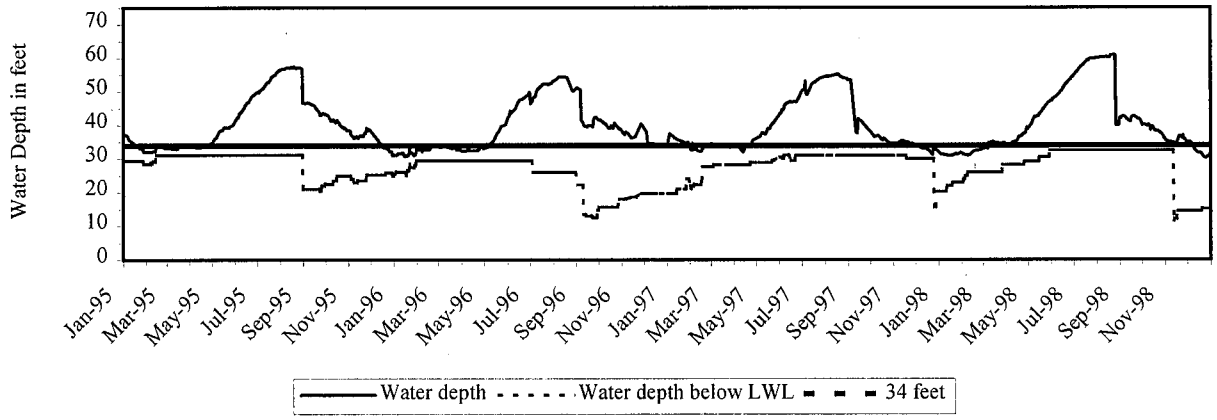
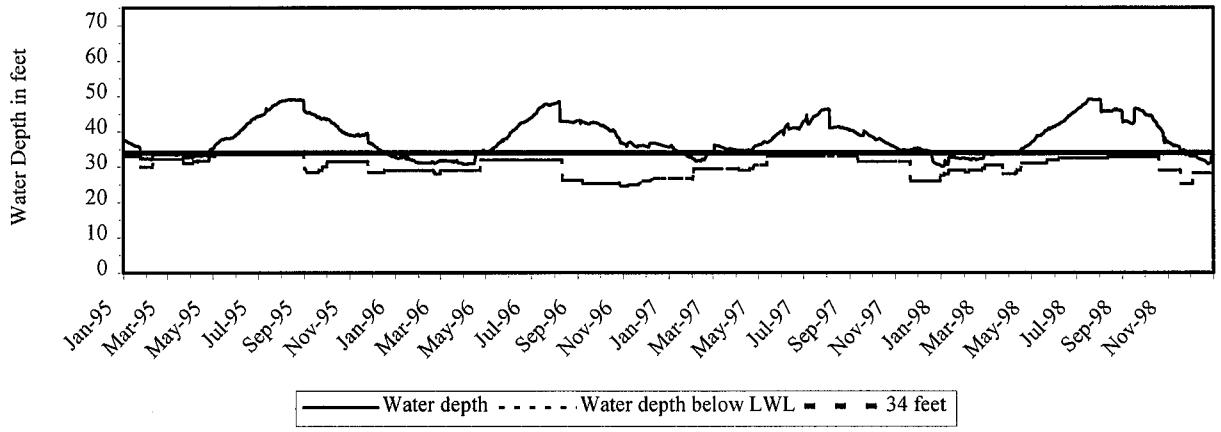


Fig. 3-2-41 Seasonal Variation in Depth Below LWL in Rio Grande Channel (1/2)

GUASINA SECTION



CURIAPO SECTION

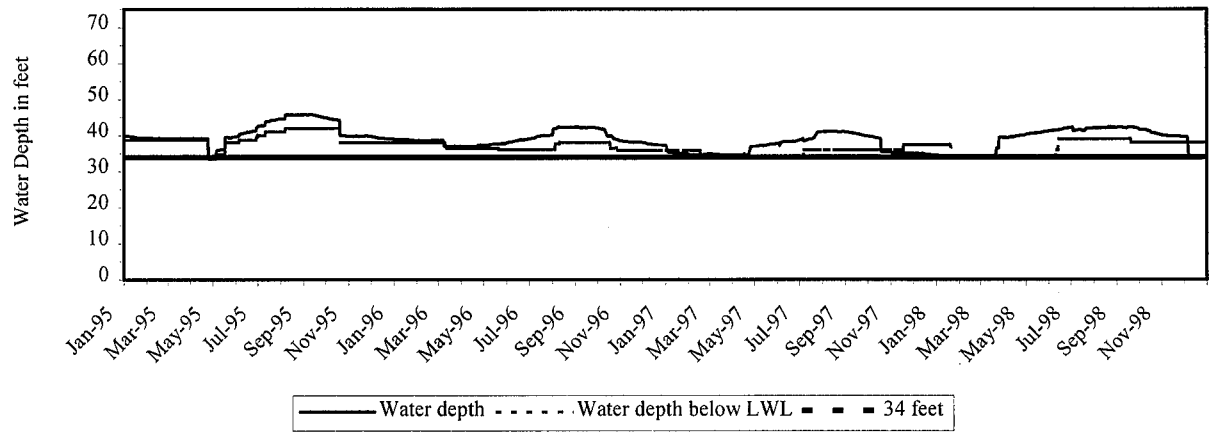
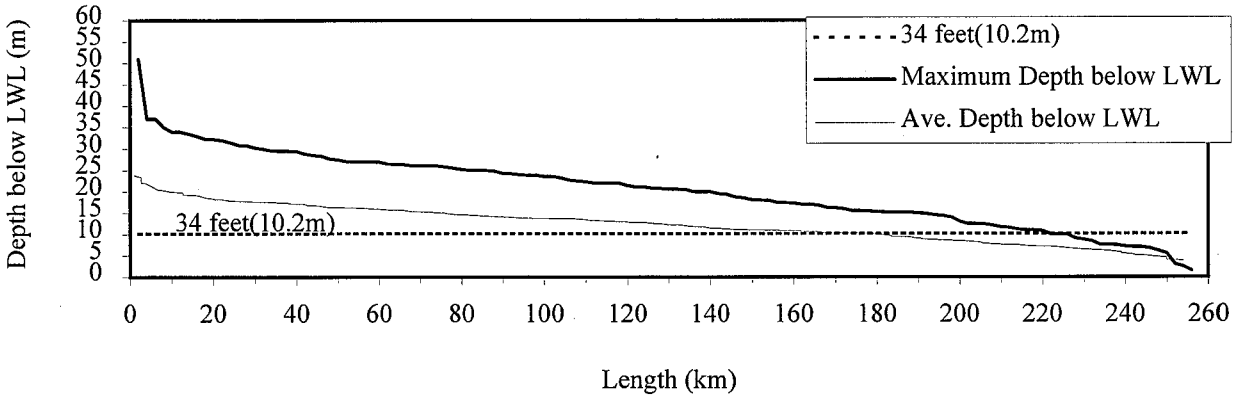
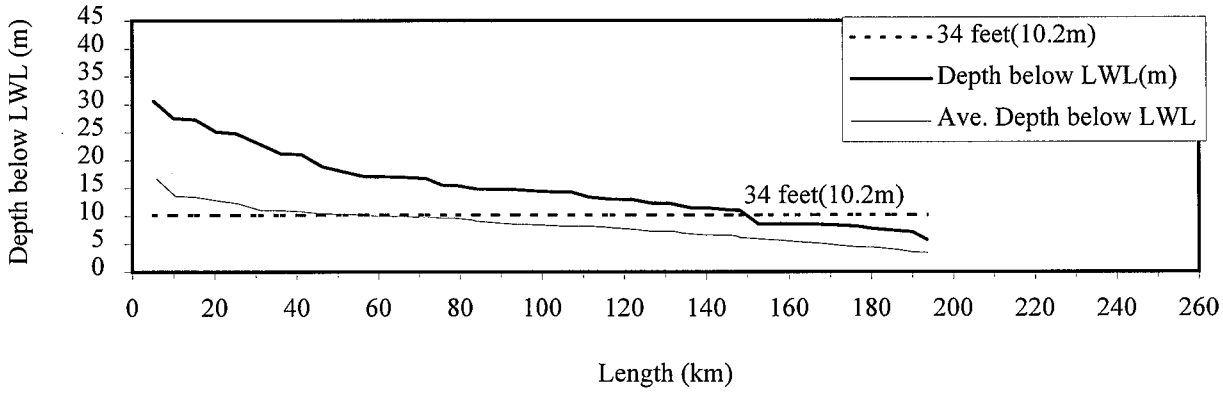


Fig. 3-2-41 Seasonal Variation in Depth Below LWL in Rio Grande Channel (2/2)

RIO GRANDE CHANNEL (1995)
-River Sections-



MACAREO CHANNEL (1998)



MANAMO CHANNEL (1998)

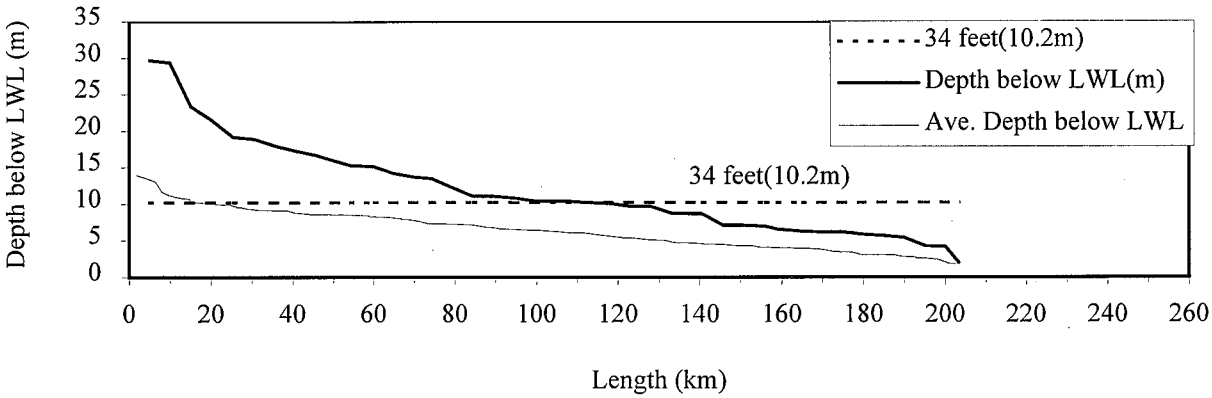
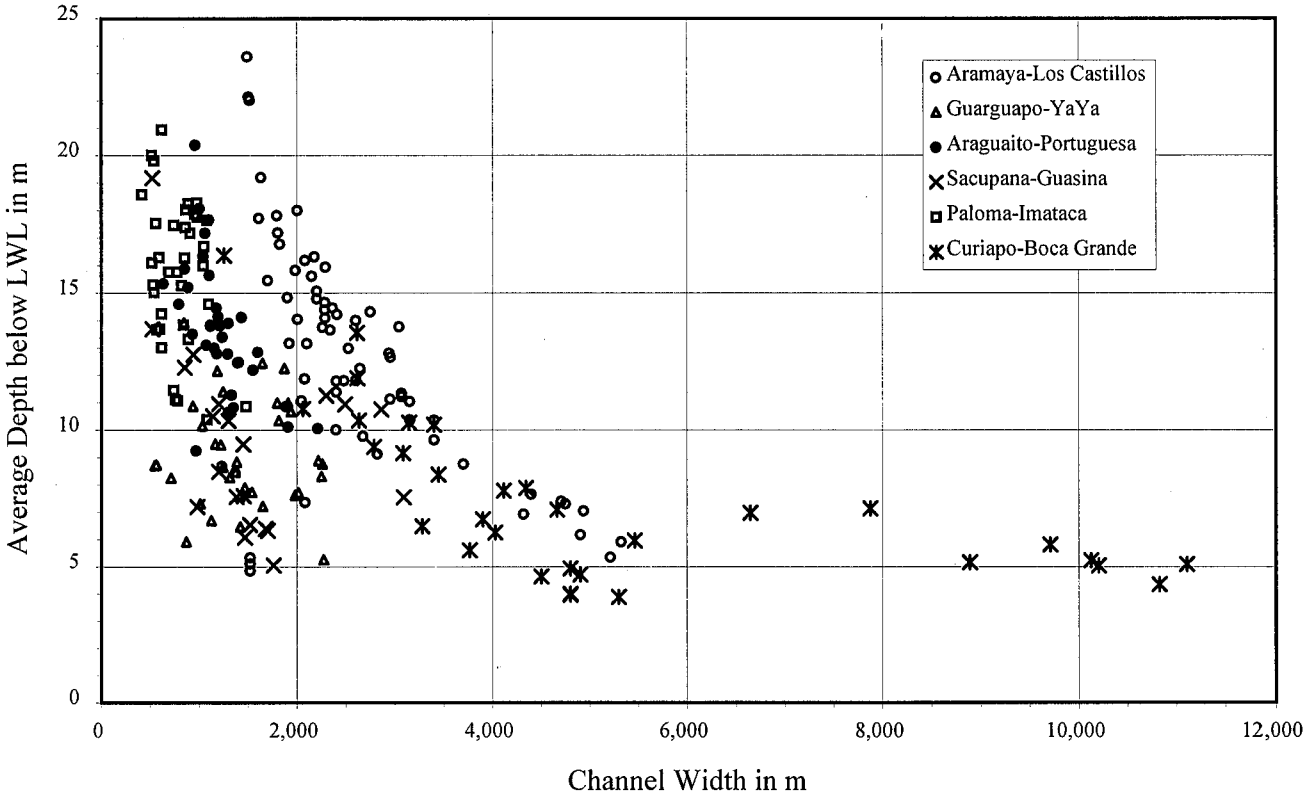


Fig. 3-2-42 Statistical Distribution of Maximum Depth Below LWL

RIO GRANDE BY SECTION



MACAREO AND MANAMO CHANNELS

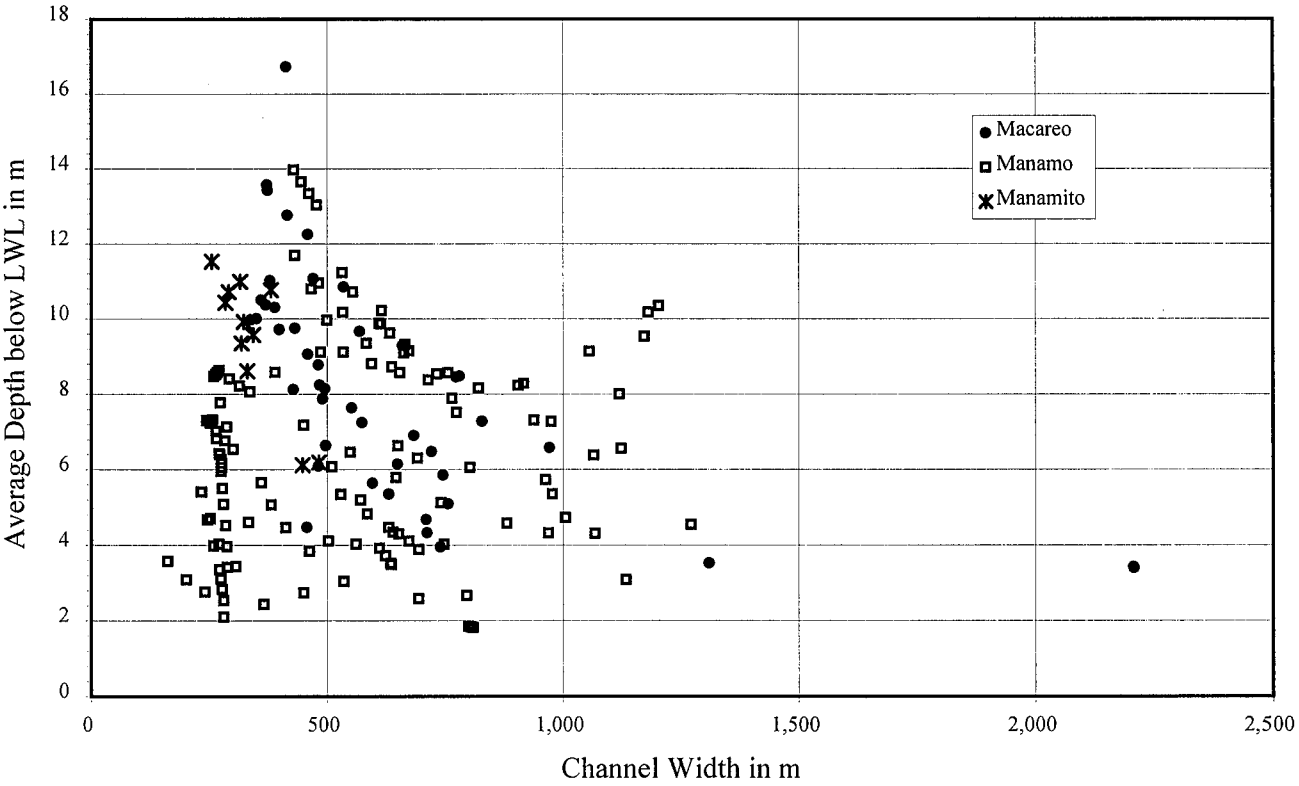


Fig. 3-2-43 **Relations Between Channel Width and Average Depth Below LWL**