



*

(/ / : / / :)

Archive of SID

)

/ /

:

()

/

()

()

()

()

()

()

()

()

- Wyoming

- Andrews

- Kircher

- Platte

- Ashmore & Day

- Saskatchewan

- Nash

- Batalla & Sala

- Arbucies

()

- Miller & Wolman

- Richard et al.

- Leopold

- Pickup & Warner

()

() / /
()

()

/ /

()

/ /

S_PLUS

/
()

/ / /

()

()

/

- Andrews & Nankervis

- Whiting

- Sichingabula

- Marguerite & Hope

Fraser

Red

Heins & Simon

... -

.()

-

(ton/km ²)		(m ³ /s)	()		(km ²)		
/	/	/			/		
/	/	/			/		
/	/	/			/		
/	/	/			/		
/	/	/			/		
/	/	/			/		

)

()

)

(

)

(

:

()

)

)

(

(

()

()

R^2		
/	$Q_s = 148.37 Q_w^{2.5292}$	
/	$Q_s = 63.739 Q_w^{1.9825}$	
/	$Q_s = 82.474 Q_w^{2.1458}$	
/	$Q_s = 37.712 Q_w^{2.5579}$	
/	$Q_s = 227.43 Q_w^{1.9283}$	
/	$Q_s = 7.5579 Q_w^{1.8612}$	

(: ()

()

)

Y

(X

$$R = \frac{n+1}{m}$$

)

(X

(:

...

/ / /

/ / / :

/ / / /

/

()

()

/ ()

) ()

(() ()

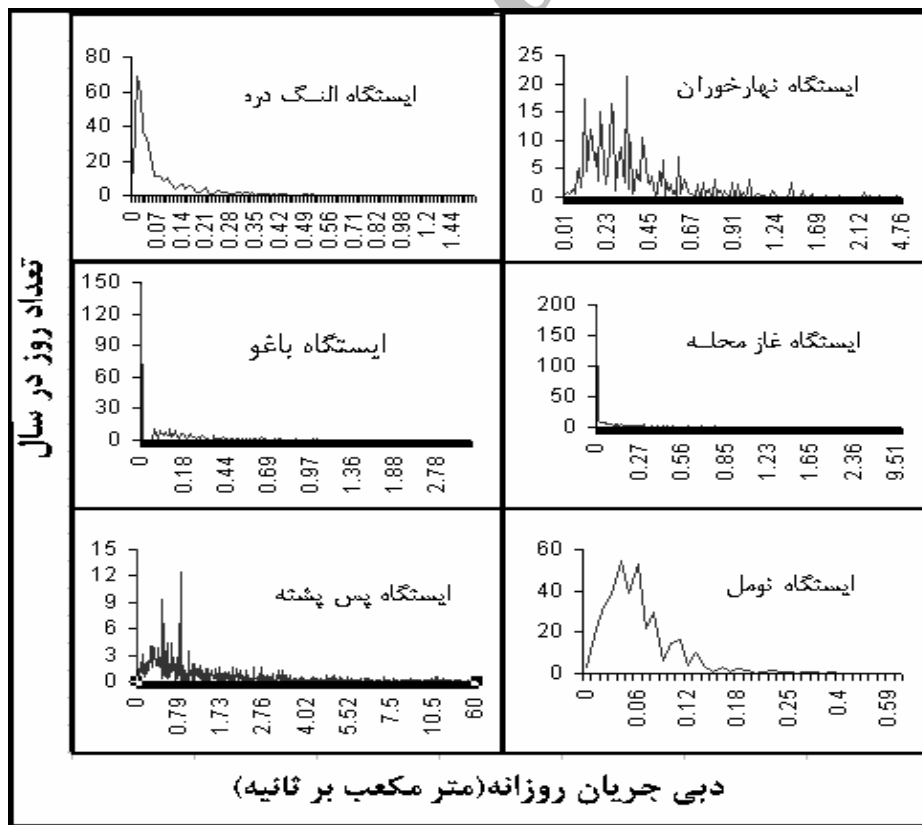
()

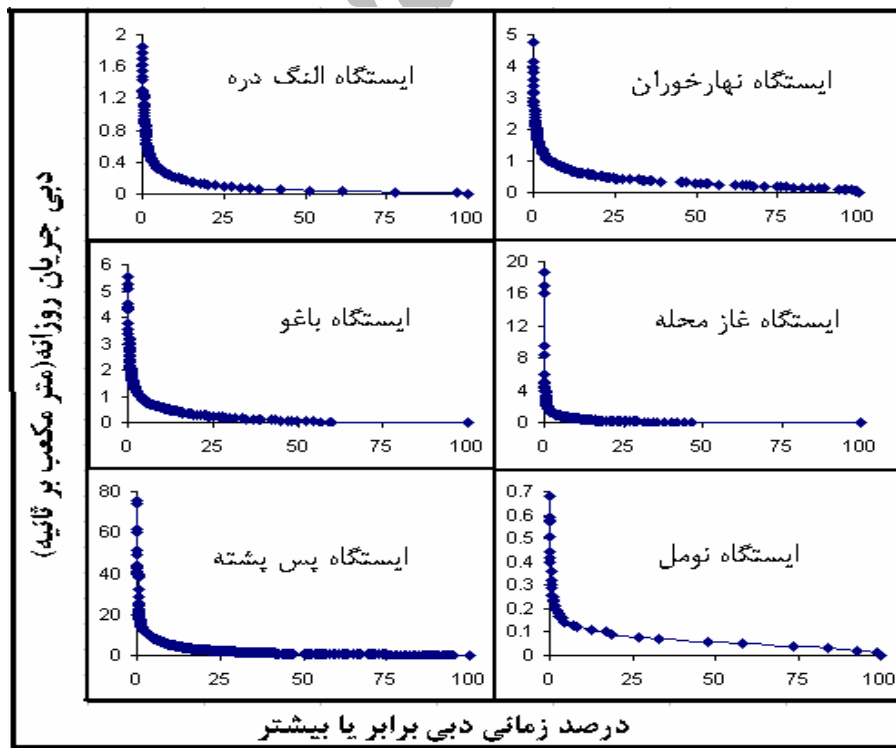
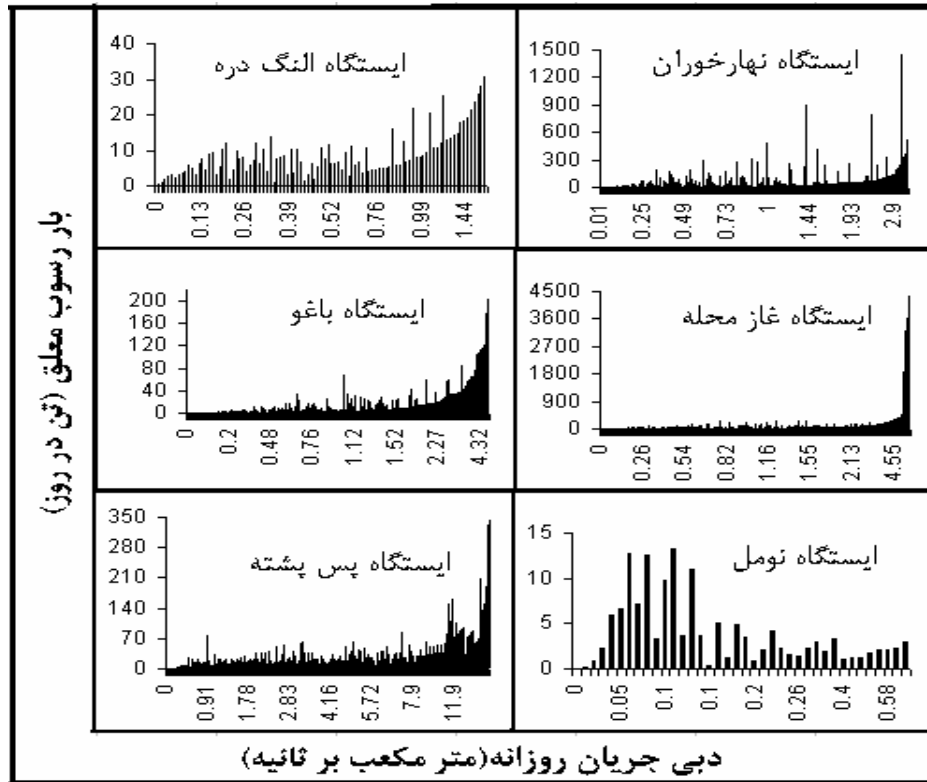
()

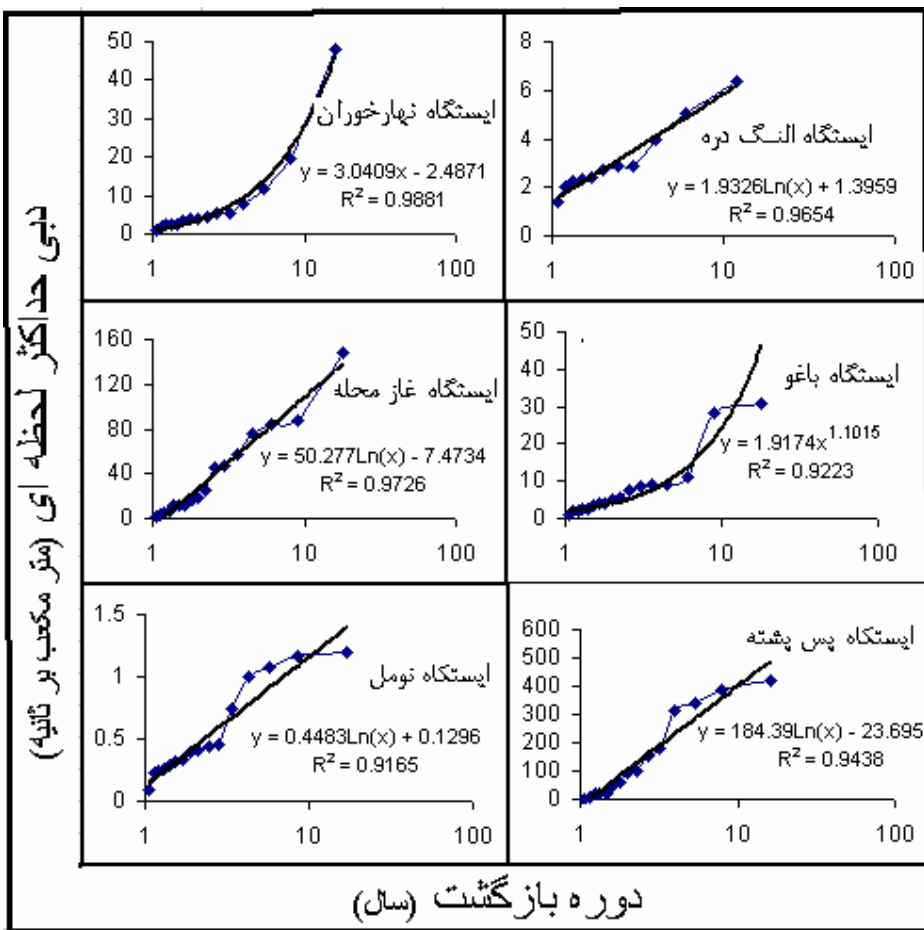
Q _{eff} / A	% (Q _{eff} / ΣQs)	() (ΣQs)	(Q _{eff})				(km ²)	
			%	()	()	(m ³ /s)		
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	



۵۱







Arch

() () () ()

-
- 4- Andrews, E.D., 1980. Effective and bankfull discharges of streams in the Yampa River basin, Colorado and Wyoming, *Journal of Hydrology*, 46: 311-330.
- 5- Andrews, E.D. & J.M. Nankervis, 1995. Effective discharge and the design of channel maintenance flows for gravel-bed rivers, American Geophysical Union, *Geophysical Monograph* 89: 151–164.
- 6- Ashmore, P.E. & T.J. Day, 1988. Effective discharge for suspended sediment transport in streams of Saskatchewan River basin, *Water Resources Research*, 24 (6), 864-870.
- 7- Batalla, J.R. & M. Sala, 1995. Effective discharge for bed-load transport in a sub-humid Mediterranean sandy gravel-bed river, John Wiley & Sons, New York, pp. 93-103.
- 8- Heins, A. & A. Simon, 2002. An Investigation of Effective Discharge for Suspended Sediment by Level III Ecoregion, American Geophysical Union, Fall Meeting, abstract H22C-0907.
- 9- Kircher, E.J., 1981. Sediment transport and effective discharge of the North Platte, South Platte and Platte Rivers in Nebraska, US Geological Survey Open File Report 81-53.
- 10- Leopold, L.B., 1994. *A View of the River*, Harvard University Press, Cambridge, Massachusetts, 298 pp.
- 11- Nash, D.B., 1994. Effective sediment-transporting discharge from magnitude-frequency analysis, *Journal of Geology*, 102: 79-95
- 12- Richard L., R.L. Orndorff & P. J. Whiting, 1999. Computing effective discharge with S-PLUS Computers & Geosciences, 25: 559-565.
- 13- Pickup, G. & R.F. Warner, 1976. Effects of hydrologic regime on magnitude and frequency of dominant discharge, *Journal of Hydrology*, 29: 51–75.
- 14- Sickingabula, H.M., 1999. Magnitude-frequency characteristics of effective discharge for suspended sediment transport, Fraser River, British Columbia, Canada, *Hydrol. Process*, 13:1361-1380.
- 15- Simon, A., W. Dickerson & A. Heins, 2004. Suspended-sediment transport rates at the 1.5-year recurrence interval for ecoregions of the United States: transport conditions at the bank-full and effective discharge? *Geomorphology*, 58: 243–262.
- 16- Whiting, J.P., F.J. Stamm, B.D. Moog & L.R. Orndorff, 1999. Sediment-transporting flows in headwater streams *Geol. Soc. Amer. Bulletin*, 111(3):450–466.
- 17- Wolman, M.G., & J.P. Miller, 1960. Magnitude and frequency of forces in geomorphic processes. *Journal of Geology*, 68: 54-74.

An Investigation of magnitude-frequency of effective discharge for suspended sediment transport in sub-catchments of Gorgan Drainage Basin

S. Feiznia^{*1}, H.Ahmadi², J. Ghoddosi³ and J. Dastorani⁴

¹ Professor, Faculty of Natural Resources, University of Tehran, I. R. Iran

² Professor, Faculty of Natural Resources, University of Tehran, I. R. Iran

³ Research Assistant Professor, Soil conservation & Watershed Management Research Institute, I. R. Iran

⁴ Scientific Member, Faculty of Natural Resources, University of Kurdistan, I. R. Iran

(Received 2005 June 27, Accepted 2006 May 16)

Abstract

Suspended sediment transport by rivers is important in water quality of cities and villages fed by certain drainage basins. Therefore determination of effective discharge and its characteristics, which carries the highest amount of sediment in long term, is very important. To determine characteristics of effective discharge, probability density function for water discharge is calculated based on daily discharge data and by multiplying coefficients of sediment rating curves by probability density function, sediment density function is drawn. Then, its return period is calculated by statistical analysis of maximum instantaneous discharge. In this research, the above-mentioned method was employed for six headwater streams of Gorgan Drainage basin, using statistical data of suspended sediment records in the past 13 to 16 years in regions with areas between 13 and 165.5 km². The results have shown that suspended sediment of effective discharge of the stations is between 0.11 to 75.4 (m³s⁻¹), their average frequencies between 0.07 to 16.5 days per year and their return period ranges from 0.96 to 2.07 with of average 1.45 years. The amount of sediment transported by effective discharge is higher than the amount of sediment transported by other discharges, and varies by 3.7 to 15 percent as compared to yearly-suspended sediment. Furthermore, comparing different stations in terms of specific suspended sediment of effective discharge, it has been shown that Nomal and Pasposhte hydrometric stations have the lowest and largest amounts, respectively. Generally, effective discharge for suspended sediment occurs every year or every two years and carries the highest amount of sediment in sub-catchments as compared to other discharges.

Keywords: Effective discharge, Suspended sediment, Probability density function, Sediment rating curve, Specific sediment of effective discharge, Gorgan Drainage Basin

* Corresponding author: Tel: 0261-2249313 , Fax: 0261-2249313 E-mail: sfeiz@chamran.ut.ac.ir