UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service - Regional Technical Service Center
7600 West Chester Pike, Upper Darby, Pennsylvania 19082

November 18, 1970

TSC-TECHNICAL NOTE - WATERSHEDS - UD-26

Re: Economics - Guidelines and Adjustment Factors to Account for Changes in Future Values

The purpose of this Technical Note is to provide (1) interim future value adjustment factors for use in Preliminary and Watershed Investigation Reports, and (2) guidelines for the local development of future value adjustment factors for Watershed work plans and Project Measure work plans in the Northeastern States. This Technical Note cancels TSC Advisory WS-UD-7, dated June 29, 1970.

Pending the receipt of proposed additions to the Economics Guide for Watershed Protection and Flood Prevention, and based on the decision that the Office of Business Economics-Economic Research Service per capita income projections meet Senate Document No. 97 requirements for long-term projections, future values may be adjusted accordingly. This is based on the premise that current property and labor values will increase at essentially the same rate as per capita personal income.

However, this is not applicable to the value per visitor day used for recreation nor the agricultural crop and pasture prices which previously have been published as projected adjusted normalized prices by the Water Resources Council. Adjustments to reflect future values may be made for other than the above excepted items when determining values for flood damages, benefits, and operation, maintenance, and replacement costs. This should be done after (1) the current values have been converted to the adjusted normalized price base, and (2) after the current physical and economic conditions have been adjusted to reflect the expected conditions over the evaluation period.

Attachment No. 1, which consists of Tables I and II, gives the future value adjustment factors for preliminary and watershed investigation studies in the Northeastern States. Two series of factors, each based on 5-1/8 percent, 5-3/8 percent, and 5-5/8 percent interest rates, are provided for this region.

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TECHNICAL NOTES

One series, Table I, is for the OBE Water Resource Planning Areas and the other series, Table II, is for the OBE Economic Areas.

The Water Resource Planning Areas and Economic Areas are defined on the two maps contained in Volume I of the Preliminary Report on Economic Projections for Selected Geographic Areas, 1929 to 2020. This publication was transmitted to all State Conservationists by Washington Advisory RB-5, dated May 19, 1969.

The location of a watershed, river basin, or RC&D project with respect to these area delineations will determine which factor(s) applies. The Water Resource Planning Area adjustment factors probably will be appropriate for most of our preliminary estimates for Watershed and River Basin planning activities. However, where local data indicate that the economy of the project area is more closely related to the economy of the Economic Area as opposed to the aggregate Water Resource Planning Area, the appropriate OBE Economic Area adjustment factor should be used. The appropriateness of either one of the two factors is a determination that must be made in the field on a case-by-case basis. ?

For Watershed and Project Measure work plan studies, compute adjustment factors based on projections of historic data in the benefited areas related to (1) property values and/or (2) local per capita income. Plot a time series curve and project to 2020, based on past trends, expected future social and economic developments, etc., and compute the appropriate adjustment factor(s) as shown in Attachment No. 2.

Attachment No. 2 is an example of the step-by-step procedure used in computing adjustment factors for the 50- and 100-year evaluation period using the 5-1/8 percent interest rate for a project located within the boundary of the Licking-Kentucky-Salt Water Resource Planning Area

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Attachments.

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TABLE I

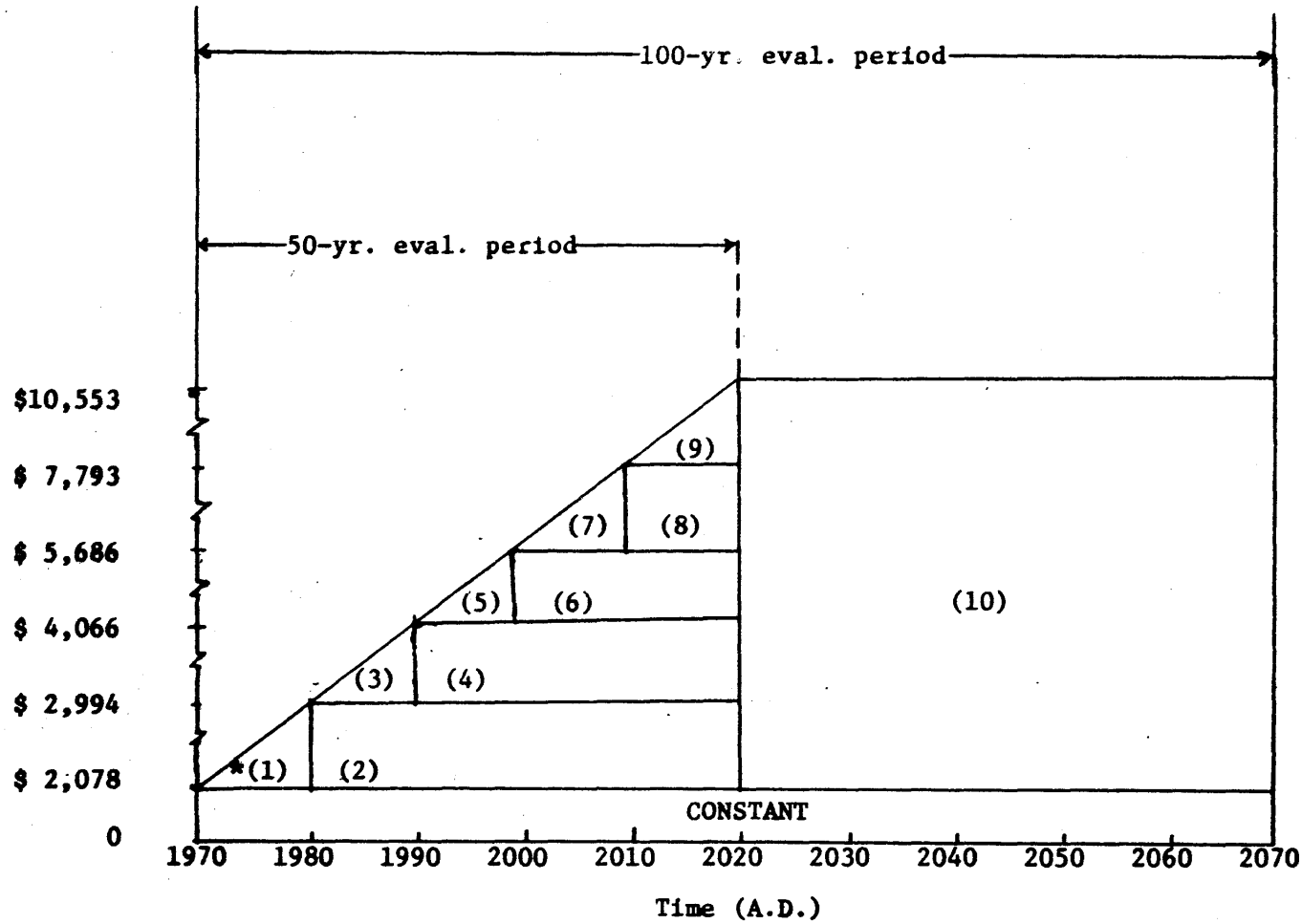
WATER RESOURCE PLANNING AREAS		FACTORS FOR EVALUATION PERIOD					
NO.	NAME	50 years			100 years		
		5-1/8%	5-3/8%	5-5/8%	5-1/8%	5-3/8%	5-5/8%
1001	Saint John	1.87	1.84	1.82	2.10	2.05	2.01
1002	Penobscot	1.75	1.73	1.71	1.95	1.91	1.87
1003	Kennebec	1.74	1.72	1.70	1.94	1.90	1.86
1004	Androscoggin	1.78	1.75	1.73	1.98	1.94	1.90
1005	Saint Croix	1.85	1.83	1.80	2.08	2.03	1.99
1006	Presumpscot	1.82	1.80	1.78	2.04	1.99	1.95
1007	Merrimack	1.70	1.68	1.66	1.88	1.84	1.81
1008	Connecticut	1.65	1.63	1.61	1.81	1.78	1.74
1009	Narragansett	1.69	1.67	1.65	1.86	1.82	1.79
1010	Thames	1.64	1.62	1.60	1.80	1.76	1.73
1011	Saint Lawrence	1.76	1.73	1.71	1.96	1.92	1.88
1012	Hudson	1.74	1.72	1.70	1.93	1.89	1.85
1013	New York City Coastal Area	1.60	1.59	1.57	1.75	1.72	1.69
1014	Passaic - Raritan	1.65	1.63	1.61	1.81	1.77	1.74
1015	Delaware	1.69	1.67	1.65	1.86	1.83	1.79
1016	Atlantic Coastal Area	1.89	1.86	1.84	2.11	2.06	2.02
1017	Susquehanna	1.80	1.77	1.75	2.00	1.96	1.92
1018	Patuxent	1.68	1.66	1.64	1.85	1.82	1.78
1019	Potomac	1.68	1.66	1.64	1.84	1.81	1.78
1020	Rappahannock - York	1.75	1.72	1.70	1.96	1.91	1.87
1021	James	1.76	1.74	1.72	1.96	1.92	1.88
2051	Roanoke	1.91	1.89	1.86	2.16	2.11	2.06
3110	South West Lake Erie	1.69	1.67	1.66	1.87	1.84	1.80
3111	South Central Lake Erie	1.63	1.61	1.59	1.79	1.75	1.72
3112	South East Lake Erie	1.68	1.66	1.64	1.85	1.81	1.78
3113	Western Lake Ontario	1.67	1.65	1.64	1.84	1.81	1.77
3114	Central Lake Ontario	1.69	1.67	1.65	1.86	1.83	1.79
3115	Eastern Lake Ontario	1.75	1.73	1.71	1.95	1.91	1.87
4151	Allegheny	1.80	1.77	1.75	2.00	1.96	1.92
4152	Monongahela	1.89	1.86	1.84	2.13	2.08	2.03
4153	Pittsburgh SMSA	1.66	1.64	1.62	1.83	1.79	1.76
4154	Beaver	1.73	1.71	1.69	1.92	1.88	1.84
4155	Upper Ohio	1.70	1.68	1.66	1.87	1.84	1.80
4156	Muskingham	1.72	1.70	1.68	1.90	1.86	1.83
4157	Kanawha - Little Kanawha	1.84	1.81	1.79	2.06	2.01	1.97
4158	Ohio - Huntington	1.73	1.71	1.69	1.92	1.88	1.85
4159	Scioto	1.70	1.68	1.66	1.87	1.84	1.80
4160	Guyandot - Big Sandy - Little Sandy	2.21	2.18	2.14	2.58	2.51	2.44
4161	Ohio - Cincinnati	1.69	1.67	1.65	1.86	1.83	1.79
4162	Little Miami - Miami	1.67	1.65	1.63	1.84	1.80	1.77
4163	Licking - Kentucky - Salt	1.91	1.88	1.86	2.15	2.10	2.05
4164	Ohio Louisville	1.73	1.71	1.69	1.92	1.88	1.85
4165	Lower Ohio - Evansville	1.80	1.78	1.76	2.02	1.97	1.93
4166	Green	1.82	1.80	1.78	2.04	1.99	1.95
4167	White	1.71	1.69	1.67	1.89	1.85	1.82
4168	Wabash	1.74	1.72	1.70	1.93	1.89	1.85
4169	Cumberland	1.95	1.92	1.89	2.20	2.15	2.10
5201	Upper Tennessee	1.89	1.87	1.84	2.13	2.08	2.04
5202	Lower Tennessee	1.91	1.89	1.86	2.16	2.11	2.06
7302	West Kentucky - West Tennessee	1.87	1.84	1.82	2.10	2.05	2.01

TABLE II

ECONOMIC AREAS		FACTORS FOR EVALUATION PERIOD					
NO.	NAME	50 years			100 years		
		5-1/8%	5-3/8%	5-5/8%	5-1/8%	5-3/8%	5-5/8%
1001	Bangor, Maine	1.80	1.78	1.75	2.01	1.97	1.93
1002	Portland, Maine	1.79	1.77	1.75	2.00	1.96	1.92
1003	Burlington, Vermont	1.78	1.76	1.74	1.99	1.94	1.90
1004	Boston, Massachusetts	1.69	1.67	1.65	1.87	1.83	1.80
1005	Springfield - Hartford, Connecticut	1.62	1.61	1.59	1.78	1.75	1.72
1006	Albany, New York	1.71	1.69	1.67	1.89	1.85	1.82
1007	Plattsburgh, New York	1.69	1.67	1.65	1.88	1.84	1.80
1008	Syracuse - Utica, New York	1.73	1.71	1.69	1.91	1.87	1.84
1009	Rochester, New York	1.65	1.63	1.62	1.82	1.78	1.75
1010	Buffalo, New York	1.68	1.66	1.65	1.86	1.82	1.79
1011	Erie, Pennsylvania	1.72	1.70	1.68	1.90	1.86	1.83
1012	Williamsport, Pennsylvania	1.73	1.71	1.69	1.91	1.88	1.84
1013	Binghamton, New York	1.76	1.74	1.72	1.96	1.92	1.88
1014	New York, New York	1.62	1.60	1.58	1.77	1.74	1.71
1015	Scranton - Wilkes-Barre, Pennsylvania	1.79	1.77	1.74	2.00	1.95	1.91
1016	Philadelphia - Trenton - Wilmington	1.69	1.67	1.65	1.87	1.83	1.80
1017	Harrisburg-York-Lancaster, Pennsylvania	1.82	1.79	1.77	2.03	1.99	1.95
1018	Washington - Baltimore	1.67	1.66	1.64	1.84	1.88	1.77
1019	Staunton - Winchester, Virginia	1.83	1.81	1.79	2.05	2.00	1.96
1020	Roanoke - Lynchburg, Virginia	1.85	1.82	1.80	2.07	2.02	1.98
1021	Richmond, Virginia	1.74	1.72	1.70	1.93	1.89	1.85
1022	Norfolk, Virginia	1.80	1.78	1.76	2.01	1.97	1.93
3048	Nashville, Tennessee	1.89	1.87	1.84	2.13	2.08	2.03
3049	Knoxville, Tennessee	1.94	1.91	1.89	2.20	2.14	2.09
3050	Bristol-Kingsport-Johnson City, Tenn.	1.97	1.94	1.92	2.24	2.19	2.14
4051	Charleston, West Virginia	1.85	1.82	1.80	2.07	2.02	1.98
4052	Lexington, Kentucky	1.95	1.92	1.90	2.20	2.15	2.10
4053	Louisville, Kentucky	1.73	1.71	1.69	1.91	1.88	1.84
4054	Evansville, Indiana	1.83	1.81	1.79	2.05	2.01	1.97
4060	Cincinnati, Ohio	1.69	1.67	1.65	1.86	1.82	1.79
4061	Columbus, Ohio	1.72	1.70	1.68	1.91	1.87	1.83
4062	Clarksburg, West Virginia	1.86	1.83	1.81	2.08	2.03	1.99
5063	Pittsburgh, Pennsylvania	1.69	1.67	1.65	1.87	1.84	1.80
5064	Cleveland, Ohio	1.65	1.64	1.62	1.82	1.79	1.75
5065	Lima, Ohio	1.74	1.72	1.70	1.94	1.90	1.86
5066	Toledo, Ohio	1.68	1.66	1.64	1.85	1.81	1.78

Basic Data
Licking-Kentucky-Salt Water Resource Planning Area

Year	Per Capita Income	Change (Δ)	Annual Change Over Period
(A.D.)	(Dollars)	(Dollars)	(Dollars)
1970	2,078	-	-
1980	2,994	916	91.60
1990	4,066	1,072	107.20
2000	5,686	1,620	162.00
2010	7,793	2,107	210.70
2020	10,553	2,760	276.00



*Numbers in parentheses denote the number of the calculation that shows how the present value of each area was determined.

50-Year and 100-Year Evaluation Periods
5-1/8 Percent Compound Interest
Licking-Kentucky-Salt Water Resource Planning Area

1. Present value of an annuity increasing by $91.60/year for 10 years:

   $91.60 X 39.06144 = $3,578

2. Present value of an annuity of $916 for 40 years, deferred 10 years:

   $916 X 16.86939 X .60665 = $9,374

3. Present value of an annuity increasing by $107.20/year for 10 years, deferred 10 years:

   $107.20 X 39.06144 X .60665 = $2,540

4. Present value of an annuity of $1,072 for 30 years, deferred 20 years:

   $1,072 X 15.15581 X .36803 = $5,979

5. Present value of an annuity increasing by $162/year for 10 years, deferred 20 years:

   $162.00 X 39.06144 X .36803 = $2,329

6. Present value of an annuity of $1,620 for 20 years, deferred 30 years:

   $1,620 X 12.33118 X .22326 = $4,460

7. Present value of an annuity increasing by $210.70/year for 10 years, deferred 30 years:

   $210.70 X 39.06144 X .22326 = $1,837

8. Present value of an annuity of $2,107 for 10 years, deferred 40 years:

   $2,107 X 7.67508 X .13544 = $2,190

9. Present value of an annuity increasing by $276.00/year for 10 years, deferred 40 years:

   $276 X 39.06144 X .13544 = $1,460

Sum of Capitalized Values = $33,747

$33,747 X .05584 (50-year amortization factor) = $1,884 - Average annual value over 50 years

Amortized average annual	=	$1,884
Constant average annual	=	$2,078
Sum	=	$3,962

$$\text{50-year evaluation period adjustment factor} = \frac{\text{Sum}}{\text{Constant}} = \frac{\$3,962}{\$2,078} = 1.91$$

Extension to 100-year evaluation period by holding 2020 per capita income constant for the remainder of the evaluation period

10. Present value of an annuity of $8,475 for 50 years, deferred 50 years:

$8,475 X 17.90893 X .08217 = $12,472

Sum of 2nd 50-year capitalized values	=	$12,472
Sum 1st 50 years capitalized values	=	$33,747
Sum 2nd 50 years capitalized values	=	12,472
Grand Total Capitalized Values-100 years	=	$46,219

$46,219 X .05160 (100-year amortization factor) = $ 2,385 - Average annual value over 100 years

Amortized average annual	=	$2,385
Constant average annual	=	2,078
Sum	=	$4,463

$$\text{100-year evaluation period adjustment factor} = \frac{\text{Sum}}{\text{Constant}} = \frac{\$4,463}{\$2,078} = 2.15$$