Montana DEQ - Water Quality Standards Attainment Record

Reporting Cycle: 2020 **Assessment Record:** MT41I003_010 .pdf **Status:** Unassigned

ASSESSMENT UNIT INFORMATION

Reporting Cycle:	2020
Assessment Unit:	MT41I003_010
Waterbody Name:	Canyon Ferry Reservoir
Location Description:	CANYON FERRY RESERVOIR

Water Type:	Size (Miles/Acres)	Use Class:
FRESHWATER LAKE	32810 ACRES	B-1

Hydrologic Unit Code:	10030101
HUC Name:	Upper Missouri
Watershed:	Upper Missouri
Basin:	Upper Missouri
TMDL Planning Area:	Missouri River
Ecoregion:	Middle Rockies
County:	Broadwater County, Lewis and Clark County
Lat/Long AU Start (U/S):	
Lat/Long AU End (D/S):	

MONITORING INFORMATION

Date Assessment Started:	05/26/1999
Assessed By:	Phillips, Perri

CITATIONS

Citation	Location	Biological Data	Habitat Data	Chemistry Data
Wright, John C. (1959), Limnology of Canyon Ferry Reservoir: II. Phytoplankton Standing Crop and Primary Production	WQPB Ebrary	chlorophyll	riparian &/or instream surveys & physical features	
Wright, John C. (1960), The Limnology of Canyon Ferry Reservoir: III. Some Observations on the Density Dependence of Photosynthesis and its Cause	WQPB Ebrary	chlorophyll	riparian &/or instream surveys & physical features	
Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)	WQPB Ebrary	General; algae; chlorophyll	riparian &/or instream surveys & physical features	common ions, pH, conductivity, miscellaneous; major nutrients
Wright, John C. ; Rada, Ronald ; Martin, Chadwick (1974), An Investigation into the Extent and Cause of Eutrophication in Canyon Ferry Reservoir, Montana, Project A-055 MONT	DEQ Metcalf Stacks	algae; chlorophyll	riparian &/or instream surveys & physical features	common ions, pH, conductivity, miscellaneous; major nutrients
Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790	WQPB Ebrary	algae; chlorophyll	riparian &/or instream surveys & physical features	benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; quantitative physical data
Unknown (1977), Canyon Ferry Management and Development Plan and Environmental Impact Statement	WQPB Ebrary	algae; fish; macroinvertebrates; other bacteriological data; wildlife	General; riparian &/or instream surveys & physical features	
Brustkern, Richard (1986), The Interrelated Costs and Benefits Associated with Agricultural and Hydropower Water Use, Report #156	WQPB Ebrary		Land use	quantitative physical data
Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report No. 159	WQPB Ebrary	algae; chlorophyll		common ions, pH, conductivity, miscellaneous; major

Citation	Location	Biological Data	Habitat Data	Chemistry Data
				nutrients; quantitative physical data
Montana Department of Fish, Wildlife, and Parks ; Thomas, Ginger (1992), Canyon Ferry Reservoir/Missouri River Fisheries Management Plan, January 1993 to January 1998	WQPB Ebrary	fish	riparian &/or instream surveys & physical features	common ions, pH, conductivity, miscellaneous; quantitative physical data
Thomas, Ginger (1992), Canyon Ferry Reservoir Risk Assessment: The Potential Impacts of Introduction of Five Non-Native Species	WQPB Ebrary	fish		common ions, pH, conductivity, miscellaneous; quantitative physical data
Phillips, Glenn R. ; Bahls, Loren L. (1994), Lake Water Quality Assessment and Contaminant Monitoring of Fishes and Sediments From Montana Waters	WQPB Ebrary	algae; fish	riparian &/or instream surveys & physical features	benthic sediment data; bioaccumulation; major nutrients; metals; quantitative physical data; toxicity tests
(1998), DEQ Field Assessment Form	Assessment Record	algae; chlorophyll	photo points; riparian &/or instream surveys & physical features	Rosgen type; benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data; toxicity tests
Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17	DEQ Metcalf Stacks	algae; chlorophyll; fecal coliforms	photo points	benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; metals; organics; quantitative physical data

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Citation	Location	Biological Data	Habitat Data	Chemistry Data
Rezanka, Richard L. ; Butler, Malcolm G. (1998), Variation Among Benthic Invertebrate Communities From Lakes in a Five-State Region (Master's Thesis)	WQPB Ebrary	macroinvertebrates		common ions, pH, conductivity, miscellaneous; major nutrients; quantitative physical data
Shields, Ronald R. ; White, Melvin K. ; Ladd, Patricia B. ; Chambers, Clarence L. ; Dodge, Kent A. (1998), Water Resources Data: Montana Water Year 1997, USGS Water-Data Report MT-97-1	WQPB Ebrary	fish		benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data
Montana State Library Natural Resouce Information System ; Montana State University (2006), Montana View at http://montanaview.org/	DEQ PPA Data Archive	chlorophyll; fecal coliforms; macroinvertebrates; other bacteriological data	photo points; riparian &/or instream surveys & physical features	benthic sediment data; bioaccumulation; common ions, pH, conductivity, miscellaneous; imagery data; major nutrients; metals; organics; quantitative physical data

Comments: Previously updated by Perri Phillips on 5/26/1999

DATA MATRIX
Biological Data

Comments:

Entire Reservoir (Cont.)

Data Type	Comments	Ref Num	Citation
algae	max total euphotic zone phytoplankton standing crop near dam = 29.75 mm3/l in 1957, 8.02 in 1958, 4.99 in 1971, 5.53 in 1972 (productivity decreased); production increased to max of 1.68 gC/m2/day on 27 July; prod max of 1.52 gC/m2/day on 14 August 1972	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)
algae	b-g algal blooms reported on reservoir since 1955; in 7/84, a toxic bloom killed 11 cows & entire reservoir was quarantined; 2 seasonal peaks in b-g abundance: 6/29/86 & mid to late 8/86	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report No. 159
algae	avg. zooplankton densities (except rotifers) were similar to those observed in 1959 & 1965, although sig spatial & seasonal variations were noted	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
fish	1986 - 1989: rainbow pops declined; 1989 - spring 1992: consistently low rainbow pops; rainbow pop incr in fall 1992; brown pop low since reservoir filled in 1955 - highest brown pops immed after filled; yellow perch most abundant species; perch pop flucs attributed to spring weather & low reservoir levels during spawning	651	Montana Department of Fish, Wildlife, and Parks ; Thomas, Ginger (1992), Canyon Ferry Reservoir/Missouri River Fisheries Management Plan, January 1993 to January 1998

Entire Reservoir (Continued)

Data Type	Comments	Ref Num	Citation
algae	net primary production decreased near the dam from 1957 & 1958 to 1971 & 1972 as estimated using chlorophyll a data (1.26 & 0.97 to 0.39 & 0.49 gC/m2/day); tot avg productivity =0.52 in 1971 & 0.48 in 1972	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)

Data Type	Comments	Ref Num	Citation
algae	max b-g biovolumes = 26, 29, & 18 mm3/l	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report No. 159

Entire Reservoir

Data Type	Comments	Ref Num	Citation
algae	phytoplankton standing crop ranges near the dam: 0 - 2.5, 2.6 - 5, 5.1 - 7.5, 7.6 - 10, >10	3316	Wright, John C. (1959), Limnology of Canyon Ferry Reservoir: II. Phytoplankton Standing Crop and Primary Production
algae	five classes of phytoplankton: diatoms, green algae, cryptomonads, dinoflagellates, blue-green algae; blue-green algae (Aphanizomenon flos-aquae), then diatoms most abundant species; larger standing crop at upper end; total cell volumes = 1.4 to 4.33 mm3/l in 1971, 1.4 to 3.0 mm3/l in 1972	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)
algae	bloom concs of algae (>5 mm3/l) seen 9x in 1957, 3x in 1958, 0x in 1971, 1x in 1972	190	Wright, John C. ; Rada, Ronald ; Martin, Chadwick (1974), An Investigation into the Extent and Cause of Eutrophication in Canyon Ferry Reservoir, Montana, Project A-055 MONT
algae	lakewide filamentous algae bloom in July;submerged macrophytes near inlet in Sept; N limited	2150	Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790
algae	aquatic plants are sparce	647	Unknown (1977), Canyon Ferry Management and Development Plan and Environmental Impact Statement
algae	relative biomass of blue-green algae negligible < 18C; same blue-green algal species have been present at same levels and temporal periodicity since 1955; major WQ problem is	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report

Data Type	Comments	Ref Num	Citation
	blue-green toxin synthesis, rather than biomass levels		No. 159
algae	blooms of toxic blue-green algae documented in Canyon Ferry	1623	Phillips, Glenn R. ; Bahls, Loren L. (1994), Lake Water Quality Assessment and Contaminant Monitoring of Fishes and Sediments From Montana Waters
algae	algae biovolume more than recorded in 1974 & less than recorded in 1987; blue greens appeared in June & predominated til fall; large floating mats observedat several sites; diatoms dominated after fall turnover & spring; Anabaena predominated in September, which may produce toxic blooms (recorded in 1984 by Bahls)	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
chlorophyll	chlorophyll a ranges near dam: 0 - 2.5, 2.6 - 5, 5.1 - 10, 10.1 - 15, 15.1 - 25 ug/l	3316	Wright, John C. (1959), Limnology of Canyon Ferry Reservoir: II. Phytoplankton Standing Crop and Primary Production
chlorophyll	avg chlorophyll a concs near dam: 5.8 to 21 ug/l	2542	Wright, John C. (1960), The Limnology of Canyon Ferry Reservoir: III. Some Observations on the Density Dependence of Photosynthesis and its Cause
chlorophyll	1971 avg concs = 3 to 25 ug/l; 1972 avg concs = 2.8 to 47.7 ug/l; high correlation (r = 0.91 btw cell volume & avg chl a concs)	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)
chlorophyll	5/75 - 3.4 to 9.5 ug/l; 7/75 - 2.6 to 13.2; 9/75 - 2.9 to 9.2; 10/75 - 1.2 to 7.7	2150	Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790
chlorophyll	maximum chlorophyll levels in near surface waters at 200 ug/l at Station 3(upper end) vs. 44 ug/l at Station 2 (middle) vs. 34 ug/l at Station 1 (lower end)	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report

Data Type	Comments	Ref Num	Citation
			No. 159
chlorophyll	reservoir hypereutrophic based on chlorophyll a values; highest levels in August & September; lowest levels in May; overall values fll within ranges previously observed, indicating no changes in productivity over last 20 yrs	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
fish	small mountain whitefish population; large population of rough fish: carp, longnose & white suckers, flathead chub, stonecat	647	Unknown (1977), Canyon Ferry Management and Development Plan and Environmental Impact Statement
fish	one of heaviest fished areas in the state; recent declining trend in sport fisheries; 4 to 6 rainbows/gill net in 1991; 5% of rainbow pop is wild; 2 browns/gill net in 1991; 78 browns > 10"/mile in 1991; sport fishery = rainbow, brown, yellow perch, mountain whitefish, burbot; nongame = carp, longnose sucker, white sucker, Utah chub; rainbows pop sustained thru stocking; fluctuations in rainbow pops may be tied to success of stocking	651	Montana Department of Fish, Wildlife, and Parks ; Thomas, Ginger (1992), Canyon Ferry Reservoir/Missouri River Fisheries Management Plan, January 1993 to January 1998
macroinvertebrates	reservoir bottom not highly productive in micro (or macro) fauna; assumed midges & aquatic insects exist, but no studies on	647	Unknown (1977), Canyon Ferry Management and Development Plan and Environmental Impact Statement
macroinvertebrates	low relative abundance of Limnodrilus hoffmeisteri suggests a non-hypereutrophic system	2675	Rezanka, Richard L. ; Butler, Malcolm G. (1998), Variation Among Benthic Invertebrate Communities From Lakes in a Five-State Region (Master's Thesis)

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DATA MATRIX

Habitat Data

Comments:

Entire Reservoir

Data Type	Comments	Ref Num	Citation
riparian &/or instream surveys & physical features	slightly eutrophic to mesotrophic based on areal hypolimnetic O2 deficit, chorophyll a concs, phytoplankton standing crops & primary production; became less eutrophic from 1958 to 1971; approaching a steady state level of production in 1971	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)
riparian &/or instream surveys & physical features	less eutrophic in 1971-1972 than 1957-1958	190	Wright, John C. ; Rada, Ronald ; Martin, Chadwick (1974), An Investigation into the Extent and Cause of Eutrophication in Canyon Ferry Reservoir, Montana, Project A-055 MONT
riparian &/or instream surveys & physical features	eutrophic (based on N,P, secchi, DO, chlorophyll a	2150	Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790
riparian &/or instream surveys & physical features	pond constructed at southern end as part of a dust abatement program to minimize wind erosion from silts exposed when reservoir levels are low; some erosive soils & steep shorelines surround reservoir; air quality violations due to dust	647	Unknown (1977), Canyon Ferry Management and Development Plan and Environmental Impact Statement
riparian &/or instream surveys & physical features	35,200 acres @ full pool; 25 mi x 1 to 4.5 mi; avg. depth = 58 ft; max depth = 160 ft near dam; typically drawn to lowest stage in March; avg. annual drawdown = 12 ft; spawning hab for rainbow limited due to dewatering + sedimentation in tribs to Mo	651	Montana Department of Fish, Wildlife, and Parks ; Thomas, Ginger (1992), Canyon Ferry Reservoir/Missouri River Fisheries Management Plan, January 1993 to January 1998

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DATA MATRIX

Chemistry Data

Comments:

Entire Reservoir

Data Type	Comments	Ref Num	Citation
benthic sediment data	0.18 ug/g Hg; PCBs not detected; this Hg conc is relatively low compared to other waters reported in the literature	1623	Phillips, Glenn R. ; Bahls, Loren L. (1994), Lake Water Quality Assessment and Contaminant Monitoring of Fishes and Sediments From Montana Waters
benthic sediment data	sulfur concs > 500ug/l; highest Hg conc = 0.054mg/kg	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
common ions, pH, conductivity, miscellaneous	DO depletion in hypolimnion which moved up lake as well as upward in water column; lowest DO concs = 0.5 mg/l in 1971 & 0.9 in 1972 near dam; 0.9 mg/l in 1971& 1.2 mg/l in 1972 lowest DO concs near inlet	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)
common ions, pH, conductivity, miscellaneous	depression of DO at depth in July and Sept; 5/75 - 8.4 to 11.6 mg/l; 7/75 - 2.2 to 8.6; 9/75 - 0.6 to 9.4; 10/75 - 0.6 to 10.7	2150	Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790
common ions, pH, conductivity, miscellaneous	DO = 12 mg/l near inlet to 7.2 mg/l just above dam	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report No. 159
common ions, pH, conductivity, miscellaneous	during mid-summer DO concs in deeper portions likely insufficient for most gamefish	651	Montana Department of Fish, Wildlife, and Parks ; Thomas, Ginger (1992), Canyon Ferry Reservoir/Missouri River Fisheries Management Plan, January 1993 to January 1998

Data Type	Comments	Ref Num	Citation
common ions, pH, conductivity, miscellaneous	Dissolved Oxygen study funded by DEQ; data collected by Canyon Ferry Limnological Institute (1998) : 1991: DO = 8.7 to 10 mg/l; 1975: DO = 0.6 to 10.7 mg/l	4645	(1998), DEQ Field Assessment Form
common ions, pH, conductivity, miscellaneous	fecal coliform present at 2/3 of sampling sites in May; all fecal counts were below 200 ct/100 ml EPA requirements for body contact in September;Missouri inflow had highest fecal cts	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
common ions, pH, conductivity, miscellaneous	dissolved oxygen depleted below 30 day mean standard (6.5 mg/l) from mid July thru mid October 1998 in most of the water column near the dam; DO concs in river just below dam also <6.5 mg/l from July 30 thru Oct 2 1998	2471	Montana State Library Natural Resouce Information System ; Montana State University (2006), Montana View at http://montanaview.org/
major nutrients	NO3, NH3, ortho-P concs & loads higher in outflow than inflow through summer months; larger load of NO3 in outflow in 1971 may be attributed to greater drawdown in 1971; total P loads lower in outflow than inflow; highest tot P conc = 250 ug/l in hpolimnion near dam on 9/18/72	192	Rada, Ronald (1974), An Investigation into the Trophic Status of Canyon Ferry Reservoir, Montana (Ph. D. Thesis)
major nutrients	incr. NO3 loading at Townsend rel. to Townsend attributed to irrigation return Qs; P contributions to Mo above reservoir correlate with Q rather than agricultural activity	190	Wright, John C. ; Rada, Ronald ; Martin, Chadwick (1974), An Investigation into the Extent and Cause of Eutrophication in Canyon Ferry Reservoir, Montana, Project A-055 MONT
major nutrients	P loading = 2.27 g/m2/yr (2x Vollenweiders P load for eutrophic lakes);< 0.5% P load fr pt sources; <0.1% P load fr onsite septics ; > 99% P load fr nonpt sources (97.8% fr Mo); data indicate N limited due to excessive P input	2150	Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790
major nutrients	NO3 is major nutrient influencing rel abundance of blue-green algae; b-g absent when epilimnetic NO3 > 140 ug/l fr spring to fall; low N:P provides conditions conducive to b-g growth	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report

Data Type	Comments	Ref Num	Citation
			No. 159
major nutrients	total P = 0.029; based on total P & secchi disk depth (= 1.6), reservoir is eutrophic	1623	Phillips, Glenn R. ; Bahls, Loren L. (1994), Lake Water Quality Assessment and Contaminant Monitoring of Fishes and Sediments From Montana Waters
major nutrients	Dissolved Oxygen study funded by DEQ; data collected by Canyon Ferry Limnological Institute (1998) : 1992: tot P = 0.03 mg/l; 1991: NO3 + NO2 = BDL, ortho P = 0.01 to 0.06 mg/l; 1975: NO3 + NO2 = 0.04 to0.36 mg/l, tot P = 0 to 0.28 mg/l	4645	(1998), DEQ Field Assessment Form
major nutrients	avg total P (May 97 only) = 200ug/l - hypereutrophic; ortho P higher than 0.01 mg/l target level for lakes; nitrogen-limited in summer & early fall; low surface nitrogen concs favor blue-green algae; large blue/green algal blooms in 1997 assoc with high P; NO3 & NH3 higher in outflow than inflow	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
metals	numerous As HHS excds (>10% of data set); avg As conc > 20 ppb; numerous (>10%) Al ALS excds; numerous (>10%) Fe & Mn HHS excds; 3 Tl HHS excds	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
organics	pesticides & oil & grease water column analyses below detection	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
quantitative physical data	Mo in = 150.45 cfs; Magpie = 0.105; Beaver = 0.222; Confederate = 0.44; all other tribs = 4.276; Mo out = 153.84	2150	Corvallis Environmental Research Laboratory ; Environmental Monitoring & Support Laboratory (1977), Report on Canyon Ferry Reservoir, Broadwater and Lewis & Clark Counties, Montana, Working Paper No.790

Data Type	Comments	Ref Num	Citation
quantitative physical data	monthly operating records, including reservoir stage & storage capacites	2539	Brustkern, Richard (1986), The Interrelated Costs and Benefits Associated with Agricultural and Hydropower Water Use, Report #156
quantitative physical data	a physically stable water column is required for blue-green algae to proliferate and produce nuisance blooms; as T increases, b-g growth promoted	1145	Priscu, John C. (1987), Factors Regulating Nuisance and Potentially Toxic Blue-Green Algal Blooms in Canyon Ferry Reservoir, Report No. 159
quantitative physical data	avg annual Qin = 5400 cfs; peak Q recorded @ Toston = 32,000 cfs on 6/6/48; lowest Q @ Toston = 450 cfs on 7/31/89 due to diversion; surface T peaks in August to 73F	651	Montana Department of Fish, Wildlife, and Parks ; Thomas, Ginger (1992), Canyon Ferry Reservoir/Missouri River Fisheries Management Plan, January 1993 to January 1998
quantitative physical data	water in upper reservoir well mixed (shallow, wind); mid reservoir forms weak thermal structure in May to August with thermocline at 35 to 50 ft; lower reservoir thermal structure from july to August at 50 to 60 ft	649	Thomas, Ginger (1992), Canyon Ferry Reservoir Risk Assessment: The Potential Impacts of Introduction of Five Non-Native Species
quantitative physical data	Dissolved Oxygen study funded by DEQ; data collected by Canyon Ferry Limnological Institute (1998) : secchi transparency = 6 to 160 inches	4645	(1998), DEQ Field Assessment Form
quantitative physical data	hydraulic residence = 50 to 200 days; avg residence = 135 days	2541	Horn, Michael J. ; Boehmke, John (1998), The Limnology of Canyon Ferry Reservoir, Montana: Final Report Submitted to the Bureau of Reclamation, Montana Area Office, Technical Memorandum No. 8220-98-17
quantitative physical data	reservoir stage and contents in acre-feet; max elevation = 3800 ft in July 55, 56, 62, 6/23/64; min elev = 3769.15 on 4/11/67	2761	Shields, Ronald R. ; White, Melvin K. ; Ladd, Patricia B. ; Chambers, Clarence L. ; Dodge, Kent A. (1998), Water Resources Data: Montana Water Year 1997, USGS Water-Data Report MT-97-1

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Data Type	Comments	Ref Num	Citation
toxicity tests	no detectable PCBs in fish tissue; Hg fish tissue concs of 0.11 to 0.20 ug/g (all exceed HHS, but less than unlimited consumption guidelines)	1623	Phillips, Glenn R. ; Bahls, Loren L. (1994), Lake Water Quality Assessment and Contaminant Monitoring of Fishes and Sediments From Montana Waters

ASSESSMENT HISTORY

Cycle 2006

Not assessed this cycle

Cycle 2008

Not assessed this cycle

Cycle 2010

Not assessed this cycle

Cycle 2012

Not assessed this cycle

Cycle 2014

Not assessed this cycle

Cycle 2016

Not assessed this cycle

Cycle 2018

Moved Ammonia (Un-ionized) and its sources from Agriculture to Aquatic Life. Changed the Use Support of Aquatic Life from Fully Supporting to Not Fully Supporting.

Cycle 2020

Not assessed this cycle

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Overall Condition of Segment

Comments: The following difficulties were encountered in an attempt to compare and contrast Canyon Ferry data sets: 1) different sampling periods 2) sampling conducted over different depth intervals 3) different sampling locations 4) different total number of sampling stations 5) different parameters sampled (e.g., PO4 vs. SRP vs. total P) and 5) different data presentations which precluded a statistical analysis of data. Total nitrogen loading into Canyon Ferry may have increased from 1972 to 1981, as evidenced by USGS water quality and flow monitoring at Toston. (This trend has not been verified as statistically significant. A trend analysis will be conducted on these data when WQSTAT is installed on the DEQ network). This apparent increase in nitrogen loading will be addressed in the Missouri River 303(d) listings, as sources of this loading are located within the Missouri River basin above Toston. Canyon Ferry Lake may serve as an indicator of effective nutrient load reductions upstream in the Missouri River basin.
Aquatic Life & Cold Water Fishery: CHEMISTRY = moderate impairment: one ammonia ALS exceedence in 1997 & bioaccumulation of mercury is slightly above background levels in fish; Canyon Ferry has been meso-eutrophic since 1957 in accordance with Table 14-11 in Wetzel (1983); N:P ratios indicate nitrogen limitation in 1975 & 1997; NO3 & PO4 concentrations have been fairly constant from 1975 to 1997; HABITAT = no impairment: shoreline erosion due to reservoir management minimal (avg drawdown is 12 ft); soils naturally erosive & steep around most of reservoir; also, habitat enhanced at southern end with constructed ponds (however, no recent habitat assessment); BIOLOGY = healthy fishery impacted by stocking; impacts to Canyon Ferry tributary spawning habitats will be addressed separately through tributary listings; no trends are evident in chlorophyll a data; low relative abundance of Limnodrilus hoffmeisteri suggests a non-hypereutrophic system. Agriculture: specific conductance is < 1500 umhos/cm; however, toxic algal bloom in 1984 (Priscu, 1987) killed 11 cattle. Industrial: use not restricted by high salinity or turbidity. Drinking Water: Arsenic & Thallium human health standard exceedences. Fish Consumption: fish consumption advisory in effect for mercury in 13.1 to 27.8" walleyes, 9.4 to 11.6" perch & 14.8 to 17.7" burbot. Primary Contact (recreation): beach closures, nuisance algal blooms.

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USE SUPPORT DECISION

Use Class B-1

Trophic Status: MESOTROPHIC **Trophic Trend:** Unknown

Uses	DQA	Method, Data, and Information Used	Assessment Type and Confidence	Use Support	Partial Flag	Use Support Certainty	Threatened
Aquatic Life				Not Fully Supporting	No		No
Agricultural				Not Fully Supporting	No		No
Drinking Water				Not Fully Supporting	No		No
Primary Contact Recreation				Not Fully Supporting	No		No

Method Number and Description

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IMPAIRMENT INFORMATION

Uses	Cause (Confidence): Source(Confirmed)	Observed Effects
Aquatic Life	91 (): 56 (N), 65 (N), 85 (N), 92 (N)	
Agricultural	500 (Low): 56 (N), 122 (N), 156 (N)	
Drinking Water	96 (): 2 (N), 56 (N), 155 (N) 393 (): 2 (N), 56 (N)	
Primary Contact Recreation	500 (Low): 56 (N), 122 (N), 156 (N)	

Cause Number and Description	Source Number and Description	Observed Effect Number and Description
91-Ammonia, Un-ionized 96-Arsenic 393-Thallium 500-Algae	2-Acid Mine Drainage 56-Impacts from Abandoned Mine Lands (Inactive) 65-Internal Nutrient Recycling 85-Municipal Point Source Discharges 92-On-site Treatment Systems (Septic Systems and Similar Decentralized Systems) 122-Site Clearance (Land Development or Redevelopment) 155-Natural Sources 156-Agriculture	

DELISTING / STATUS CHANGES

Cause	Reason for Change	Date of Change
Excess Algal Growth	Not caused by a pollutant (4C)	01/25/2008

Reporting Cycle: 2020 **Assessment Record:** MT41I003_010 .pdf **Status:** Unassigned

CATEGORY INFORMATION

Previous Cycle

Cycle	2018
Category	5 - Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
User Defined Category	N/A

Current Cycle

Cycle	2020
Category	5 - Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
User Defined Category	N/A