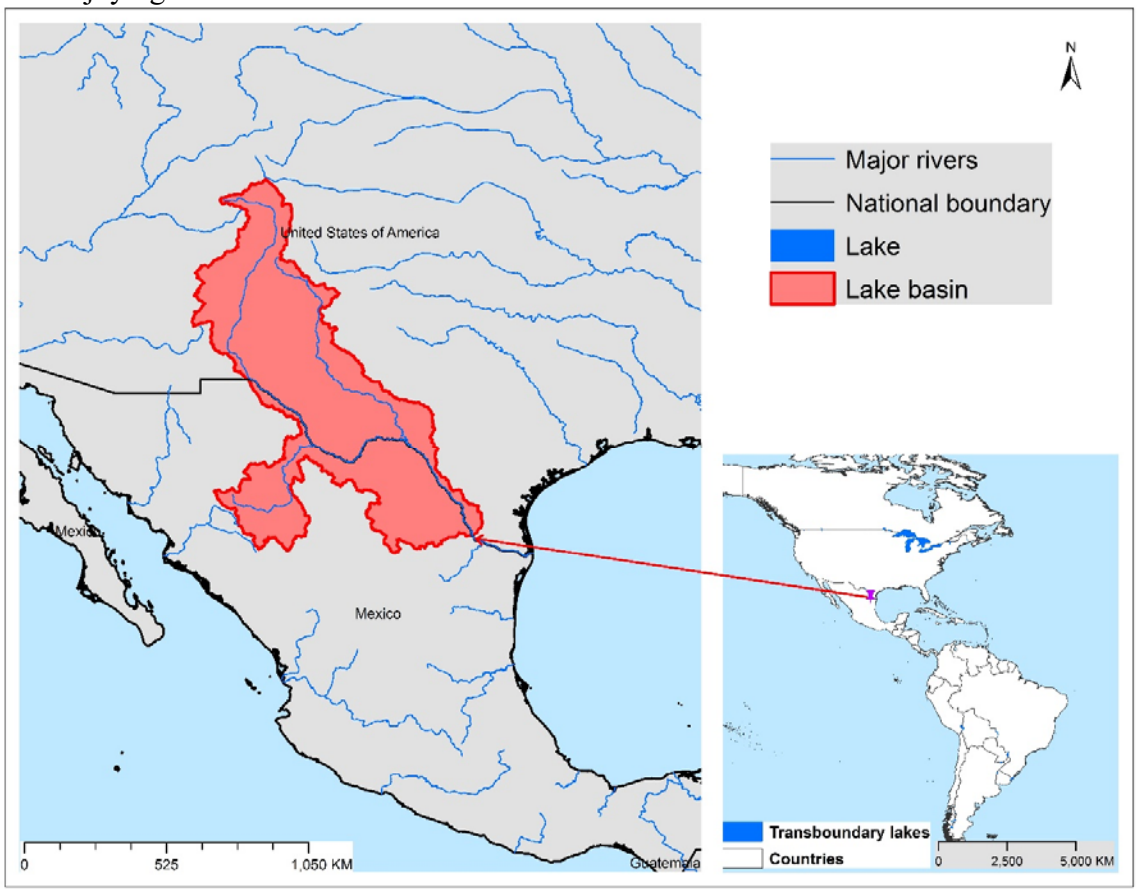
Lake Profile Brief

This is based on the results of Multiple Lake Threat Assessment and its Scenario Analysis. Refer to the Technical Report for details.

Falcon Lake

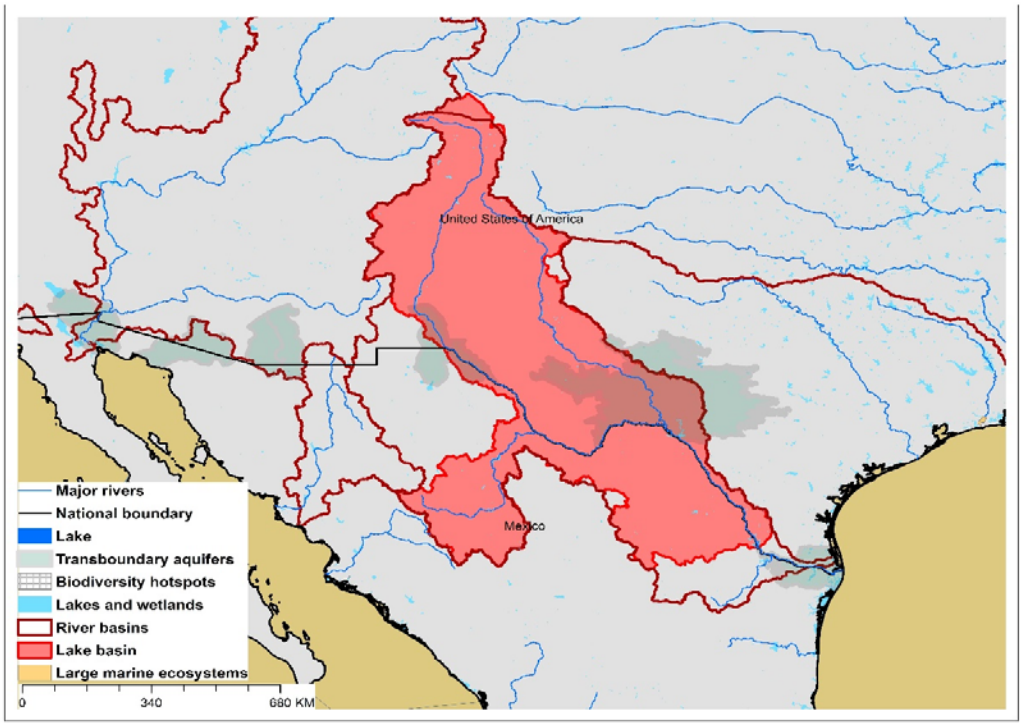
Geographic Information

Falcon Lake is an international reservoir on the transboundary Rio Grande southeast of Laredo, Texas and Nuevo Laredo, Tamaulipas, Mexico. Along with upstream Lake Amistad, which is included in its drainage basin, it was constructed by Mexico and the United States to jointly manage allocation of the waters of the transboundary portion of the Rio Grande between Texas and Mexico, as specified in the 1944 Treaty between the two countries. Its functions also include water conservation, agricultural irrigation, flood control, water sports, and hydropower production. It is especially important in regard to providing irrigation water for the major agricultural activities on both sides of the border on the lower Rio Grande. It also is a popular fishing location. At the same time, there have been episodes of piracy and armed robbery of boaters enjoying the reservoir.

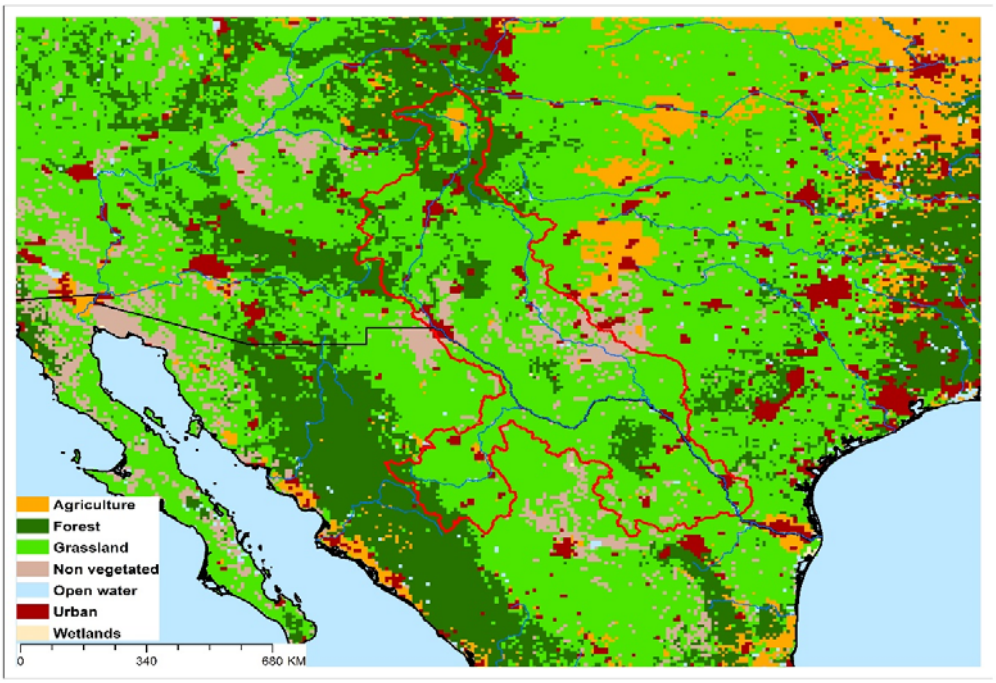


TWAP Regional Designation	Northern, Western & Southern America	**Lake Basin Population (2010)**	6,364,997
River Basin	Rio Grande	**Lake Basin Population Density (2010; # km^{-2})**	14.0
Riparian Countries	Mexico, USA	**Average Basin Precipitation (mm yr^{-1})**	371.2
Basin Area (km^2)	459,490	**Shoreline Length (km)**	301.1
Lake Area (km^2)	120.6	**Human Development Index (HDI)**	0.85
Lake Area:Lake Basin Ratio	0.0002	**International Treaties/Agreements Identifying Lake**	Yes

Falcon Lake Basin Characteristics



(a) Falcon Lake basin and associated transboundary water systems



(b) Falcon Lake basin land use

Falcon Lake Threat Ranking

A serious lack of global-scale uniform data on the TWAP transboundary in-lake conditions required their potential threat risks be estimated on the basis of the characteristics of their drainage basins, rather than in-lake conditions. Using basin characteristics to rank transboundary lake threats precludes consideration of the unique features that can buffer their in-lake responses to basin-derived disturbances, including an integrating nature for all inputs, long water retention times, and complex, non-linear response dynamics.

The lake threat ranks were calculated with a spreadsheet-based interactive scenario analysis program, incorporating data and information about the nature and magnitude of their basin-derived stresses, and their possible impacts on the sustainability of their ecosystem services. These descriptive data for Falcon Lake and the other transboundary lakes included lake and basin areas, population numbers and densities, areal extent of basin stressors on the lake, data grid size, and other components considered important from the perspective of the user of the data results. The scenario analysis program also provides a means to define the appropriate context and preconditions for interpreting the ranking results.

The Falcon Lake threat ranks are expressed in terms of the Adjusted Human Water Security (Adj-HWS) threats, Reverse Biodiversity (RvBD) threats, and the Human Development Index (HDI) score, as well as combinations of these indices. However, it is emphasized that, being based on specific characteristics and assumptions regarding Falcon Lake and its basin characteristics, the calculated threat scores represent only one possible set of lake threat rankings. Defining the appropriate context and preconditions for interpreting the lake rankings remains an important responsibility of those using the threat ranking results, including lake managers and decision-makers.

Table 1. Falcon Lake Relative Threat Ranks, Based on Adjusted Human Water Security (Adj-HWS) and Reverse Biodiversity Threats, and Human Development Index (HDI) Score

(Estimated risks: red – highest; orange – moderately high; yellow – medium; green – moderately low; blue – low)

Adjusted Human Water Security (Adj-HWS) Threat Score	Relative Adj-HWS Threat Rank	Reverse Biodiversity (RvBD) Threat Score	Relative RvBD Threat Rank	Human Development Index (HDI) Score	Relative HDI Rank
0.50	46	0.38	53	0.85	44

It is emphasized that the Falcon Lake rankings above are discussed here within the context of the management and decision-making process, rather than as strict numerical ranks. Based on its geographic, population and socioeconomic assumptions used in the scenario analysis program, the calculated Adj-HWS score for Falcon Lake indicates a low threat rank compared to other priority transboundary lakes.

The Reverse Biodiversity (RvBD) for Falcon Lake, which is meant to describe its biodiversity sensitivity to basin-derived degradation, also places the lake in a low threat rank, compared to the other

transboundary lakes. Management interventions directed to improving the biodiversity status must be viewed with caution, however, since we lack sufficient knowledge and experience to accurately predict the ultimate impacts of biodiversity manipulations and preservation efforts. Further, the RvBD scores indicate the relative sensitivity of a lake basin to human activities, and high threat scores *per se* do not necessarily justify management interventions. Such interventions may actually increase biodiversity degradation, noting that many developed countries have already fundamentally degraded their biodiversity because of economic development activities. Thus, activities undertaken to address the Adj-HWS threats may actually degrade the biodiversity status and resources, even if the health and socioeconomic conditions of the lake basin stakeholders are improved as a result of better conditions, thereby increasing stakeholder resource consumption.

The relative Human Development Index (HDI) places the Falcon Lake basin in a low threat rank in regard to its health, educational and economic conditions.

Table 2. Falcon Lake Threat Ranks, Based on Multiple Ranking Criteria

(Scores for Adj-HWS, RvBD and HDI ranks are presented in Table 1; the ranks may differ in some cases because of rounding of tied threat scores; Estimated risks: red – highest; orange – moderately high; yellow – medium; green – moderately low; blue – low)

Adj-HWS Rank	HDI Rank	RvBD Rank		Sum Adj-HWS + RvBD	Relative Threat Rank		Sum Adj-HWS + HDI	Relative Threat Rank		Sum Adj-HWS + RvBD + HDI	Overall Threat Rank
46	44	52		98	53		90	46		142	48

When multiple ranking criteria are considered together in the threat rank calculations, the Adj-HWS and HDI scores considered together place Falcon Lake in the lower quarter of the threat ranks. The relative threat is further reduced when the Adj-HWS and RvBD threats are considered together. Considering all three ranking criteria together, Falcon Lake exhibits a low threat ranking.

Further, a series of parametric sensitivity analyses of the ranking results also was performed to determine the effects of changing the importance of specific criteria on the relative transboundary lake rankings. This analysis involved increasing or decreasing the weights applied to the threat ranks derived from multiple ranking criteria to reassess the relative impacts of the weight combinations on the threat ranks. For example, in determining the sensitivity of the Adjusted Human Water Security (Adj-HWS) and Biodiversity (BD) ranking criteria, the threat rank associated with the first was assumed to be of complete (100%) importance (i.e., rank weight of 1.0), while the other was assumed to be of no (0%) importance (i.e., rank weight of 0.0). The relative importance of the two ranking criteria was then successively changed, with weight combinations of 0.9 and 0.1, 0.8 and 0.2, etc., until the first ranking criteria (Adj-HWS) was assumed to be of no importance (rank weight of 0.0) and the second (BD) was of complete importance (rank weight of 1.0). In the case of Falcon Lake, the 0.5 and 0.5 weight combinations for three cases of parametric analysis for Falcon Lake resulted in respective threat rankings of 1st, 1st and 4th, respectively, among the total of 7 North American transboundary lakes in the TWAP study (see Technical Report, Section 4.3.3, pp44-48 and Appendix 6(2)).

In essence, therefore, identifying potential management intervention needs for Falcon Lake must be considered on the basis of both educated judgement and accurate representations of its situation. A fundamental question to be addressed, therefore, is how can one decide that a given management

intervention will produce the greatest benefit(s) for the greatest number of people in the Falcon Lake basin? Accurate answers to such questions for Falcon Lake, and other transboundary lakes, will require a case-by-case assessment approach that considers the specific lake situation and context, the anticipated improvements from specific management interventions, and its interactions with water systems to which the lake is linked.