

The Economic Value of Iowa's Natural Resources

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The Economic Value of Iowa's Natural Resources

Executive Summary

In a time of changing demographics, an increasing demand for renewable energy sources and a growing concern for the environment, policy makers in Iowa are faced with the challenge of identifying strategies for economic development that balances the needs of the changing population with economic and resource sustainability.

Agriculture is a major driving force of Iowa's rural economy with nearly 75 percent of its surface area devoted to crop production and nearly 90 percent of land area as privately-owned farmland. Even so, the demand for corn-based ethanol is driving agricultural commodity prices higher, creating greater incentive to put more land into production. On the other hand, Iowa's small percentage of public lands is supporting a growing recreation industry, which has been spurred by the increasing numbers of urban residents in the state. Urban residents desire a certain quantity and quality of outdoor recreational opportunities, which on the surface seems to fly in the face of the goals of the agricultural industry and the state's economic growth.

Because Iowans value quality natural resource-related amenities, recreation and the using of these natural resources contribute greatly to the state's overall economy and the well being of Iowans. The purpose of this study is to discuss how the social and environmental benefits of Iowa's natural resources generate significant economic values for Iowan's and to demonstrate that measurable expenditure benefits that can be calculated to inform economic development policies at the local, regional, and state levels. The study examines how outdoor recreation activities generate spending that translates into jobs and payroll totals. In addition, we consider how improvements to quality of life generated by recreation opportunities and natural resources are important to retaining and attracting skilled workers in the state. Finally, we address how environmental improvements to Iowa's natural resources can also generate economic benefits.



The results of our study can be summarized as follows:

1. Outdoor recreation opportunities are important to Iowans. More than 25 million visits are made to Iowa state parks and lakes annually. County park visits are estimated to be at a comparable level of about 23 million visitor groups. Other recreation sites such as city parks, state forest and preserves and river-based activities were not examined in this study, but also contribute to the outdoor recreation package enjoyed by Iowans. These recreation sites provide opportunities for hunting, fishing, boating, swimming, wildlife viewing, hiking, riding, picnicking and just relaxing.
2. Recreation is a large industry in Iowa. The outdoor recreation activities and visits to parks and lakes generate considerable spending that translates into substantial job and payroll totals. For the four recreation amenities with usable data (lakes, state parks, county parks and trails) we estimate spending levels of \$2.63 billion and 50 million visits. Including secondary or multiplier effects implies that more than 27,400 jobs and \$580 million in income are being generated in the Iowa recreation industry.
3. Recreation amenities and activities in Iowa generate economic benefits beyond spending impacts. In addition to the local jobs and income generated by the process of recreation spending in Iowa, there exists a surplus, or net economic value to Iowans, which is the difference between what consumers are willing to pay for an amenity and what they actually pay. National studies have estimated the economic value individuals place on a day of different types of recreation, including camping, fishing, hunting, wildlife viewing, hiking, swimming and general park activities. When these estimates are applied to the rates observed in Iowa, the economic value for the rates of participation in these outdoor recreation activities yielded aggregate economic values exceeding \$1.1 billion annually, beyond the spending impacts identified earlier.
4. Recreation opportunities and natural resources are important to retaining and attracting skilled workers in the state. Iowa, like many other Midwestern states, has had to deal with problems associated with the “brain drain” of highly educated and skilled individuals leaving rural areas, and often the state altogether. Quality of life factors are increasingly important considerations in the competition for recruiting and retaining entrepreneurs and skilled workers. National and regional studies, which include Iowa, have consistently identified quality natural resources as an important factor in rates of economic growth. These findings hold true even for non-coastal and non-mountainous states.

5. New investments to improve the environment and add recreation opportunities generate economic benefits. Improving water quality through erosion and runoff controls can translate into enhanced recreation opportunities. The Iowa Lakes Valuation Project has identified recreational benefits related to water quality in lakes and watersheds and that are substantially greater than costs of restoration. Expanded parks and facilities also demonstrate sizeable social benefits relative to costs.

Introduction

Iowa's natural resources provide great bounty and beauty. With a climate and landscape suitable for agriculture, 31.7 million acres, or 88.7% of Iowa's land area, are privately-owned farmland. Production agriculture generates more than \$13 billion of direct agricultural sales and indirectly supports billions more of value-added agricultural industries.¹ Alongside the farmland are 350,000 acres of publicly held lands in a system of state and locally owned parks, forest and preserves. Lakes and streams are additional natural resources represented by 324,000 surface acres of water in Iowa's 132 lakes, 180,000 acres of wetlands and hundreds of miles of interior rivers and streams (excluding the border rivers). Figures 1 and 2 show the distribution of Iowa's surface area and an inventory of Iowa's natural resources, respectively.

The high percentage of land in private ownership in Iowa presents a unique challenge for providing natural habitat for fish and wildlife and for offering outdoor recreation opportunities for residents. Protecting and enhancing Iowa's natural resource base while fostering the continued growth of agriculture and the value-added industries in rural areas is a challenging endeavor. Over the years a variety of creative federal, state and local government programs have provided a synergistic development track. The CRP program has taken millions of erodible acres out of production creating beneficial externalities of improved wildlife habitat and water quality. Increasingly the Farm Bill program is paying attention to natural resource and environmental issues with continued appropriations for soil conservation (terracing, buffer strips) and wetland restoration efforts. Similar appropriations toward improving water quality and wildlife habitat are likely. Easements are being offered for public hunting on private lands and abandoned rail lines are being converted to multiuse recreational trails. State and local partnerships are expanding efforts to maintain existing and create new outdoor recreation resources.

Recent changes in the rural economy are creating new opportunities for agriculture and challenges for the effort to maintain environmental progress that benefits natural resource-based recreation in rural areas. The rapid growth of the ethanol industry in Iowa and the Midwest has dramatically raised corn prices and is creating incentives to bring additional marginal acres into row crop production and limit buffer strips. More intensive agriculture practices could threaten gains in improving water quality.

¹Imerman, Mark D. David A. Swenson, Liesl Eathington, Daniel Otto. "The Economic Importance of Agri-food Industries in Iowa," ECON Staff Report, September 1, 2005
<http://www.econ.iastate.edu/research/publications/viewabstract.asp?pid=12426>



Figure 1. Iowa's Surface Area and Land Cover

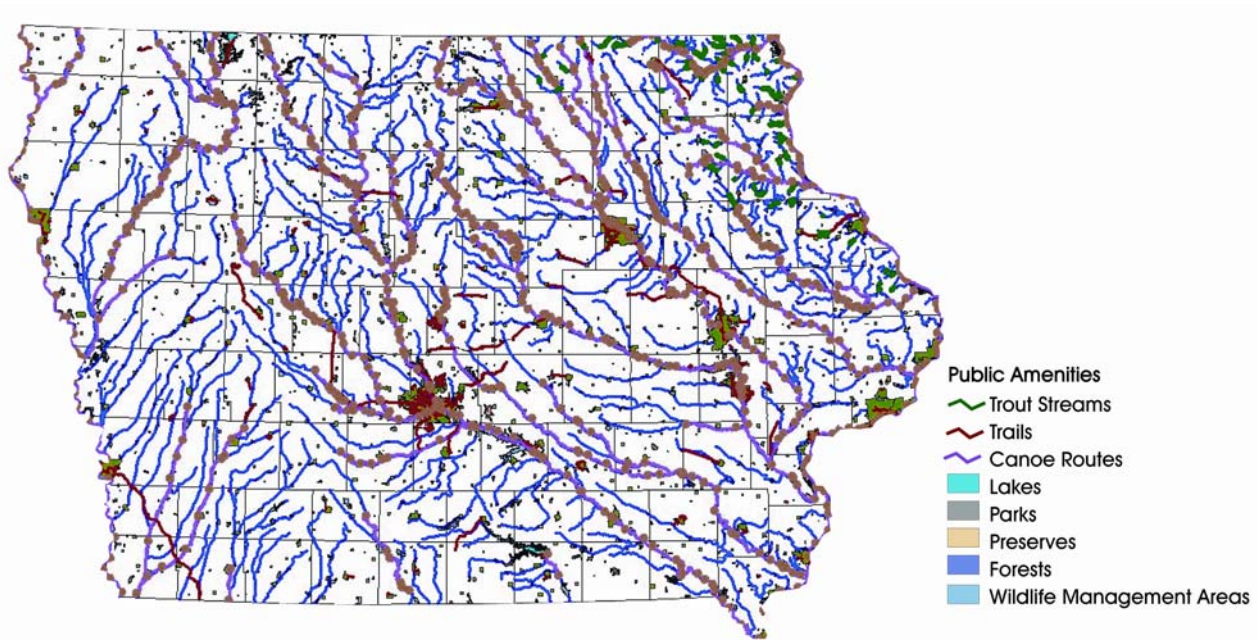


Figure 2. Iowa's Natural Resources Inventory

Iowa's changing demographics are also putting increased demands on the state's natural resource base. As the state's population becomes more urbanized, Iowa residents will increasingly want access to the natural resource base of rural areas for quality recreation opportunities. Nationwide, as well as in Iowa, rural places are increasingly sought for residences and for outdoor recreation activities. Currently 61% of the states population lives in urban areas, defined as having population densities greater than 1,000 people per square mile. The 11 major metropolitan statistical areas (MSAs) in Iowa account for 49 % of the Iowa population and most of the population growth in recent years.

While agriculture is an important industry for rural areas, the recreation industry is also a major part of the rural economy. Creating new outdoor recreation opportunities for the growing urban population can generate economic and social benefits for rural areas. Spending by Iowans and visitors supports jobs and income in recreation-related businesses. Improvements and expansion of the natural resource base would also create value by improving the quality of life for existing residents as well as helping attract new workers and residents to the state. The goal of this study is to examine the importance of the natural resource base for recreational activities. More specifically, the study will:

- Inventory the major state supported natural resource amenities in Iowa and the economic expenditures made by people using these resources.
- Estimate the economic value of these natural resources based on their use for recreation.
- Estimate the economic impact of investments in water quality improvements.
- Estimate the economic impact that would result from expanded investments in natural resources in Iowa.
- Estimate the benefits of water quality improvements that result from investments in the prevention of soil erosion.

A Framework of Recreational Amenities and Economic Activity

Recreational Amenities as a Source of Economic Vitality

Amenities, put simply, are those attributes that make living and working in a particular place more enjoyable. Unlike regular consumer goods purchased at a department store, the consumption of outdoor recreation and natural amenities often is provided for or falls under the protection of a local, state, or federal government or other regulatory body. For individuals, the opportunity to enjoy these amenities

enhances quality of life so long as these amenities—bike paths and county parks for example—are accessible and properly maintained. It is also true that it is difficult for private entrepreneurs to exact a fee from those enjoying an amenity and therefore, natural resources are not effectively regulated through markets. For example, it is difficult to exclude and monitor people using a regional park. Many amenities differ in comparison to other regional characteristics such as the quality of local services that contribute to economic well-being and quality of life. Specifically, four ways in which amenities tend to differ are that they tend to be 1) irreversible, 2) difficult to produce, 3) highly sensitive to income levels and 4) regionally non-tradable.^{2,3} Government intervention and policy is often required to maintain, develop and improve a variety of amenities as a result of the inability of the market to perform similar tasks.

Research suggests that amenities have potential as an economic growth tool because they affect the location decisions of both firms and workers.⁴ The ability to identify amenities that are in demand and to increase their quality and/or quantity, if possible, can generate additional economic activity. In the Midwest, for example, people are drawn to lakes for recreation; therefore, policies enhancing the quality, and possibly the quantity of water-based recreation, such as boating and fishing, could stimulate economic activity.⁵ Further research demonstrates that quality of life also plays an important role in economic growth at the community level. Hence, natural resources can play an important role in local as well as regional economic growth policy.^{6,7,8} Indeed, amenities have been shown to correlate positively with a variety of measures used to gauge economic performance, including population changes, employment, per capita incomes⁹ and county income.¹⁰

²Green, G.P. 2001. "Amenities and Community Economic Development: Strategies for Sustainability," *Journal of Regional Analysis and Policy* 31, 61-76.

³Green, G.P., S.C. Deller, and D.W. Marcouiller. *Amenities and Rural Development: Theory, Methods, and Public Policy*. Edward Elgar, Northampton, MA, 2005.

⁴Gottlieb, P.D., 1995. "Residential Amenities, Firm Location and Economic Development," *Urban Studies* 32(9), 1412-36.

⁵McGranahan, D. 1999. "Natural Amenities Drive Rural Population Change," United States Department of Agriculture, Food and Rural Economics Division, Agricultural Economic Report No. 781.

⁶Dissart, J.C., and S.C. Deller, 2000 "Quality of Life the Planning Literature," *Journal of Planning Literature* 15(Aug.), 135-61.

⁷Halstead, J.M. and S.C. Deller, 1997. "Public Infrastructure in Rural Manufacturers," *Journal of Community Development Society* 28(2), 149-69.

⁸Rudzitis, G., 1999. "Amenities Increasingly Draw People to the Rural West," *Rural Development Perspectives* 14(2), 9-13.

⁹Deller, S.C., T. Tsai, D.W. Marcouiller, and D.B.K English, 2001. "The Role of Amenities and Quality of Life in Rural Economic Growth," *American Journal of Agricultural Economics* 83(May), 352-365.

¹⁰Monchuk, D., J. Miranowski, D. Hayes, and B. Babcock. 2007. "An Analysis of Regional Economic Growth in the U.S. Midwest," *Review of Agricultural Economics* 29(1), 17-39.

Natural resources can also serve as part of a strategic plan to stem the exodus of young and educated persons from the Midwest and to attract these types of people from other parts of the country. An examination of the 2000 Census of the Population reveals that the locations and migration patterns of young, educated workers are highly consistent with this group's apparent preference for places rich in amenities.¹¹ Since young persons and those with high levels of human capital tend to be more mobile, development strategies emphasizing amenities alongside human capital development can complement economic growth agendas. While amenities are not the only factor that young educated persons consider when deciding where to live, it is a consideration nonetheless.

Employment Trends and Competing Demands for Natural Resources in Iowa

In 2005, approximately 106,000 people were employed in farming in Iowa, compared to about 106,600 in 2001, a decrease of about less than one half of one percent.¹² This trend represents a modest decline in agricultural employment over this five year period. However, in 2005 a boost in the number of people employed in farming was brought on in part by developments in the ethanol industry. If we instead look at 2004 as a reference, with an estimated 103,400 employed in farming in the state, the change would have been a decrease of about 3%. While it is unclear to what extent the current ethanol boom will affect agriculture in the long term, the downward trend in agricultural employment is an unfortunate reality that has put the livelihoods of many rural communities in jeopardy. In fact, since 1970, when farm employment totaled 171,000 people, employment in agriculture has fallen by almost 40%.

In comparison, during the five-year period 2001 to 2005, the employment sector that includes recreation has increased from 33,000 to over 34,100 people, an increase of about 3.0%.¹³ Taking a closer look at how gains in recreation-related employment are distributed across Iowa, it is interesting to note that gains have not been limited to urban counties. Figure 3 shows changes by Iowa county in the percentages of jobs in farming (number at the top of each county) and in recreation (number at the bottom

¹¹Gottlieb, P.D. 2004. "Labor Supply Pressures and the "Brain Drain": Signs from Census 2000," The Living Cities Census Series (January), Center on Urban and Metropolitan Policy, The Brookings Institution, Washington, DC.

¹²Employment numbers are from the Regional Economic Information System dataset from the Bureau of Economic Analysis, 2005 release.

¹³Recreation related employment is part of the industry classification that also includes arts and entertainment. While not necessarily outdoor and recreational amenities, arts and entertainment related sectors help generate other types of amenities that also improve quality of life for residents.

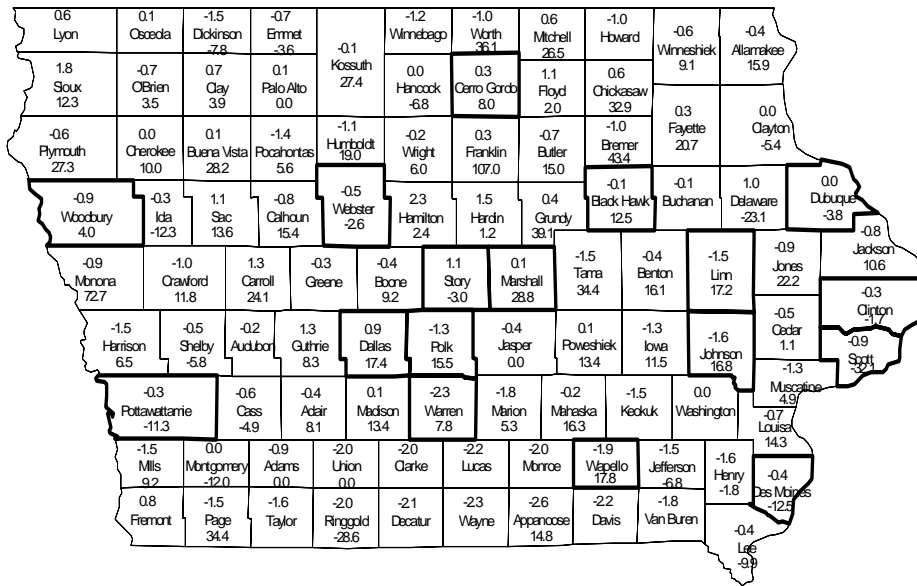


Figure 3. Percentage Change in Farm Employment (top #) and Recreation Related Employment (bottom #) 2001-2005.

Source: Regional Economic Information System Database, BEA

of each county). The changes in farm employment show that many counties, especially in the southern portion of the state, lost farm jobs.¹⁴

The urban counties in Figure 3 have a bold border, highlighting the fact that many rural counties—especially those in the central part of the state near urban counties and those in the northeastern region of the state—have experienced growth in recreation-related employment. While not definitive, these numbers do suggest that growth in rural areas is associated with activities related to outdoor recreation and natural resources. Indeed, if increased economic activity in rural counties is linked to natural resource and outdoor recreation amenities, then policy intended to revitalize rural communities should include strategies that enhance these types of amenities.

Iowa’s increasingly urban demographics will also put pressure on the recreational resources of the state. Less than 6% of Iowa’s population lives on farms and the growing share of the population in urban areas will likely want access to increased recreation opportunities, largely available in rural areas. Figure 4 shows the changes in Iowa’s urban and rural populations between 1960 and 2000.

Primary agriculture is generally quite land intensive; for that reason, some often interpret the goals of agricultural production to be in conflict with recreation and leisure activities. Operations related to crop and livestock production do have adverse

¹⁴ If no number is present under the county name, data were not available to compute change in employment from 2001 to 2005 for that county due to disclosure or other issues.

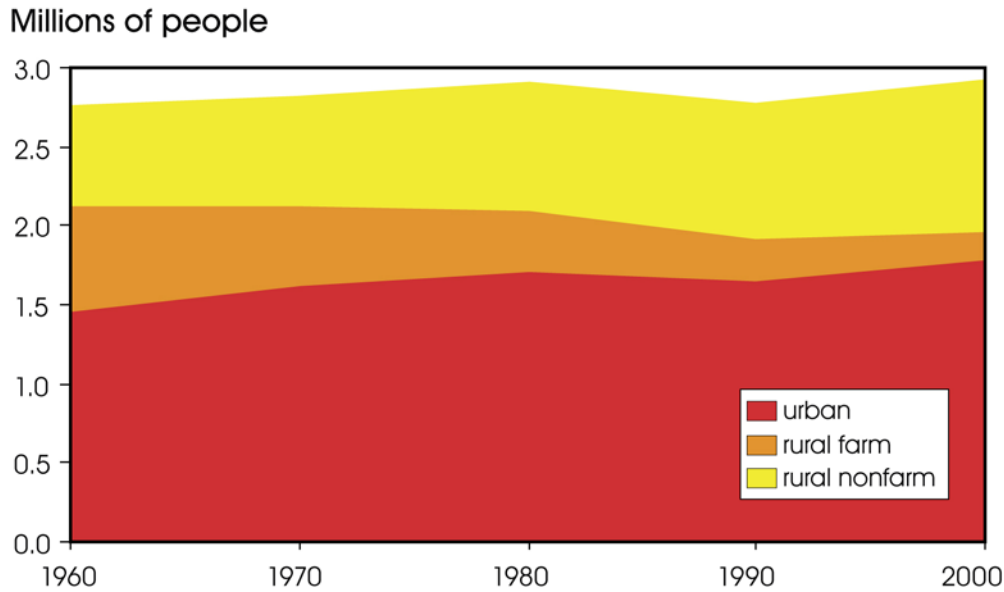


Figure 4. Distribution of Iowa's Population in Urban and Rural Areas, 1960-2000

affects on air and water quality in some instances, and as a result might have a negative impact on areas near the source of agricultural production, as well as areas many miles away. Certain agricultural activities may also negatively affect picturesque landscapes and scenic views. However, primary and value-added agricultural production can proceed alongside other forms of rural economic activity in a sustainable manner that reduces environmental degradation, provides additional income to rural residents through greater rural tourism, and eases tensions between people who live and work in rural areas and visitors from urban centers. Economic opportunities in rural areas include providing services to visitors and tourists, renting land to hunters, and increases to the state's bed and breakfast and other service-related industries.

How Iowans Benefit from Recreational and Outdoor Amenities

Iowans benefit in many ways from the recreational and natural amenities that the state has to offer. First and foremost, amenities increase residents' quality of life. Many scenic and natural resources that people like to enjoy are non-market goods. Since there are generally no market prices for activities such as camping, biking, and wildlife viewing, it is difficult to determine their value. However, the value of these amenities is evident in their positive impact on residents' quality of life. A higher quality of life means that residents are more likely to remain where they are, spend more of their time and money in the vicinity of where they live, and will be less likely to move out of the state. Keeping residents and their recreation-related expenditures

in state provides benefits to these service-related businesses in Iowa. Direct benefits include employment opportunities for those who develop, maintain, and service the parks, forests, and trails used by outdoor enthusiasts. Service industries such as food and lodging would benefit indirectly from increased quality of life.

In addition to residents and businesses, promoting natural resources and outdoor recreation can benefit the state as a whole. For example, individual and community benefits from improved recreation opportunities could include: 1) better health, 2) improved transportation systems and livability, 3) conservation of the environment, 4) economic stimulus and revitalization, and 5) historic preservation and community identity¹⁵. Stimulating depressed rural economies, improving transportation and livability, and promoting community identity further contribute to growth by encouraging more cohesion and interaction between rural and urban dwellers. In addition to the local communities themselves, these types of benefits resulting from enhanced amenities contribute to making the state as a whole by making it a more attractive place to live and work, thereby improving the image of the state in the minds of both residents and nonresidents alike.

Understanding the Benefits of Recreational and Natural Resources

Amenities Improve Quality of Life and Promote Economic Growth

In general, people are more likely to live and work in an area that has greater rather than fewer natural amenities to offer. Natural resources offer non-market benefits that improve the quality of life of those who are able to enjoy them. These benefits are derived in part from amenities that can be enjoyed on a daily basis such as clean air, a lack of noise pollution, and scenic views and sunsets, which are enjoyed right from one's patio or backyard. Other amenities improve the quality of life by providing opportunities to engage in activities that might be enjoyed less frequently, such as a monthly bike ride along a quiet stretch of abandoned rail line or a biannual family camping trip.

As noted earlier in section 2.1, natural resources can be effectively used as part of an economic development strategy and that quality of life due to amenities at the community level can play an important role in local and regional economic growth policy. Although individuals are not restricted to their places of residence when engaging in outdoor activities, research has shown that availability of outdoor

¹⁵ While these benefits might easily apply to a range of recreational amenities, this particular list was associated with the conversion of abandoned rail rights-of-way to multipurpose recreational trails found on the rails-to-trails conservancy Web site:
<http://www.railstotrails.org/whatwedo/railtrailinfo/benefits.html#economy> (accessed Sept. 23, 2007)

recreation amenities in a certain county plus its neighboring counties contributes to that county’s economic growth. In a study based in the Midwest, analysis using an amenity index incorporating features such as rails-to-trails, state park characteristics, recreational land and water areas, indicates a positive relationship between amenities and aggregate county income growth.¹⁶ The amenity index used in that study, shown in Figure 5, demonstrates that Iowa, while lacking the same natural resource base as states like Minnesota and Wisconsin, still has pockets of high amenity areas that tend to be associated with enhanced county economic growth.

As incomes continue to rise, people will continue to place higher value on leisure and recreation. For these individuals, and especially those with high incomes, the availability of certain amenities will become an increasingly important consideration influencing where families choose to live. In the last century this move has been quite obvious as employers and employees and their families have continued to move west to the mountains of Colorado or onward to the West Coast, where scenic and recreational amenities abound. The dot-com boom during the 1990s is a good example

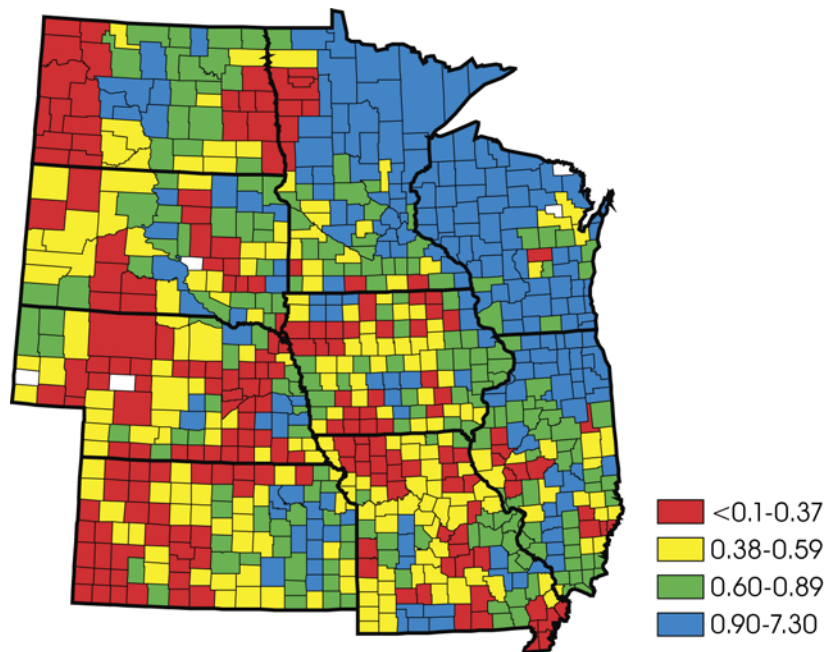


Figure 5. Amenity Index Based on Home plus Amenities in the Nearest Four Counties (larger values indicate higher amenity levels)

¹⁶ Monchuk, D., J. Miranowski, D. Hayes, and B. Babcock. 2007. “An Analysis of Regional Economic Growth in the U.S. Midwest,” *Review of Agricultural Economics* 29(1), 17-39.

of how scenic beauty and recreational amenities can be an important consideration for firms when making location decisions. Many high technology and information-intensive firms relying on skilled workers are located in western states that offer a variety of mountain and coastal amenities. At the same time, undesirable factors such as pollution have adverse impacts on labor market growth.¹⁷ Looking forward, as long as incomes continue to rise and people demand more outdoor recreation alternatives, the value of natural resources will continue to grow. Furthermore, as people become more environmentally conscious and call for more stringent environmental regulations, such amenities will take on even greater importance.

Amenity Development as a Policy to Achieve Other Goals

Amenities to Retain Skilled Iowans and Halt the Brain Drain

Extensive literature exists that links higher education and other forms of human capital to increased rates of economic growth. Unfortunately for some areas, rural in particular, the task of retaining highly educated and skilled workers is problematic. Iowa, like many other Midwestern states, has had to deal with problems associated with highly educated and skilled individuals leaving its rural counties, and often the state altogether. This outflow of skilled and educated persons is generally referred to as “brain drain.”

For rural regions, the problem of brain drain is major concern; even though the returns to secondary education are positive in rural areas, the returns to higher education are considerably more in urban areas. As a result, higher urban incomes greatly exceed higher rural incomes.¹⁸ In the absence of other non-monetary benefits that add non-monetary value to a place of residence, those highly educated rural residents will have a tendency to leave rather than stay. For a state as a whole, losing this particular demographic group is especially troubling since, in addition to earning higher incomes, this group also tends to develop and adopt cutting edge technologies that reshape the business climate, leading to higher levels of economic growth. To address the problem of brain drain, we must determine how to retain and attract highly educated and skilled individuals. One possible solution is to enhance the availability and quality of various types of amenities.

¹⁷ Pagoulatos, A., S.J. Goetz, D.I. Debertin, and T. Johannson. “Interactions between Economic Growth and Environmental Quality in U.S. Counties.” *Growth and Change* 35(Winter 2004):90-108.

¹⁸ Huang, T., P.F. Orazem, and D. Wohlgenuth. 2002. “Rural Population Growth, 1950-1990: The Roles of Human Capital, Industry Structure, and Government Policy,” *American Journal of Agricultural Economics* 84(3): 615-27.

Evidence exists demonstrating that a population’s level of education influenced the demand for natural resource-related and outdoor recreational amenities. Studies that surveyed university graduates have revealed that the availability of a variety of amenities, among other factors, was an important consideration in determining where respondents planned to live.¹⁹ While amenities are not the only factor that young educated persons consider when making their location decisions, it is a consideration nonetheless. As noted earlier in section 2.1, census data support the hypothesis that economic growth strategies should emphasize development of amenities as well human capital.

A survey of Waterloo/Cedar Falls rails-to-trails users further reinforces the fact that education level affects amenity use. Figure 6 shows that for age groups between 20 and 59, the most common users are those that have some college, a college degree or have pursued further education beyond college.

Offering more in-state recreational and outdoor amenities increases the likelihood that expenditures will stay within the state. However, since relatively more mobile,

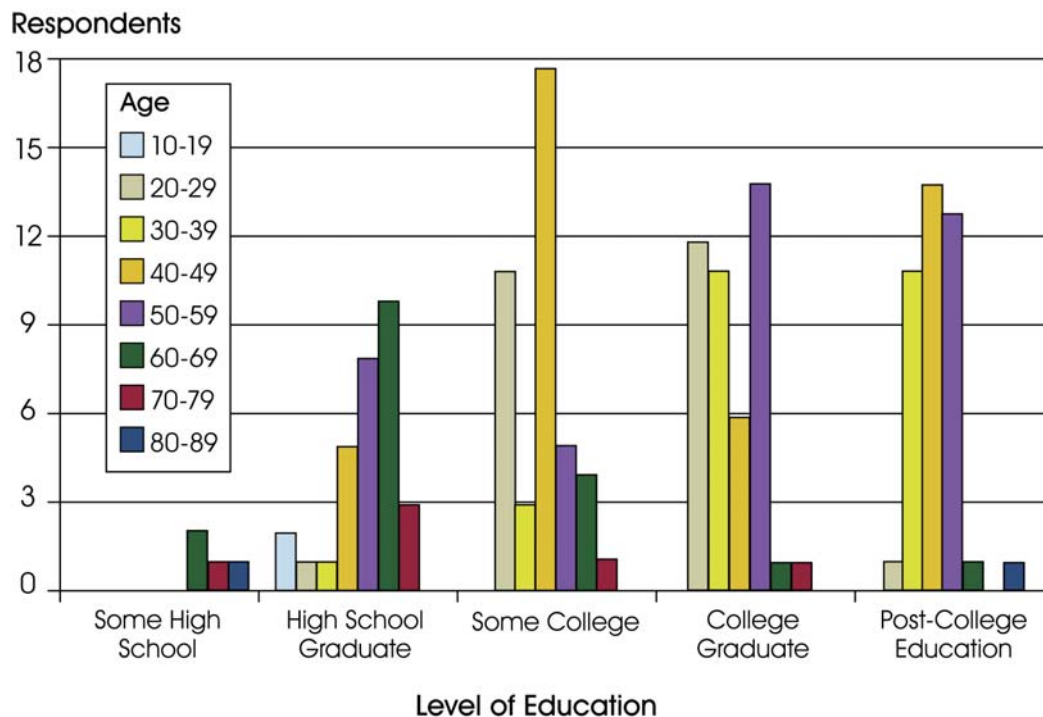


Figure 6. Waterloo/Cedar Falls, Iowa: Education Level of Trail Users by Age (2000)

Source: 2000 Survey of Waterloo/Cedar Falls Trail Usage

¹⁹ Hansen, S.B., C. Ban, and L. Huggins. 2003. “Explaining the “Brain Drain” from Older Industrial Cities: The Pittsburgh Region,” *Economic Development Quarterly* 17(2):132-147.

educated and high income persons can afford to travel outside of the state more regularly, simply offering recreational opportunities is not enough. Keeping this demographic from spending its recreation dollars out-of-state requires that natural and recreational amenities are of the same or higher quality of those available out-of-state. Trails and parks, as well as rivers, lakes, and other natural resources, must be well managed and maintained. Otherwise, these natural resources will cease to provide the quality of life enhancements necessary to satisfy the population's demand for amenities. If these resources degrade significantly, residents might migrate to other areas that offer more amenities of higher quality and efforts to attract potential residents will be hampered.

Promoting Environmental Awareness through Natural Amenities and Outdoor Recreation

In the last decade, and especially the last few years, many Americans have begun to take notice of a variety of global as well as local environmental issues. Global warming, reducing fossil fuel consumption, and limiting environmental degradation resulting from industrial and agricultural production are featured in the media almost daily. Fortunately, in many situations environmental agendas can complement protection, promotion, and sustainable use of natural resources. For example, a change in farming practices that reduces fertilizer and pesticide runoff could improve water quality downstream, benefiting the environment as well as enhancing attributes of outdoor amenities. In the case of riparian buffer strips, the proper combination of trees, shrubs, and plants can remove sediment and chemicals before they enter lakes and streams, thereby improving water quality. Properly designed buffer strips can help to moderate flooding, prevent soil erosion, recharge underground water supplies and preserve wildlife habitat. All of these consequences create a more aesthetically pleasing, more beautiful landscape.²⁰ These enhancements to natural resources can increase their value to outdoor enthusiasts, anglers and hunters.

In September 2007, President Bush formally recognized the international effort to curb global warming and announced a tentative framework to replace the Kyoto protocol when it expires in 2012.²¹ The problem of elevated atmospheric greenhouse gas concentrations has gained increased political attention in the past few years largely because reports by the Intergovernmental Panel on Climate Control state that

²⁰ Stewards of our Streams: Buffer Strip Design, Establishment, and Maintenance," University Extension, Iowa State University (April 1997), available online at: <http://www.extension.iastate.edu/Publications/PM1626B.pdf> (last accessed Nov. 13, 2007).

²¹ Fialka, John. "Bush's Alternative to Kyoto Pact on Warming Gets a Cool Response," *The Wall Street Journal*, Sept. 30, 2007.

human activities are contributing significantly to global warming.²² While specific policies to combat global warming in the United States have yet to be established, the types of agricultural and land-use practices that are sure to be ushered in by these policies will in all likelihood promote more green space in the countryside and less reliance on fossil fuels. Such changes would, in most cases, complement natural and scenic characteristics and lead to other developments such as bike trails. At the same time, promoting green technologies as alternative sources of energy could have an adverse impact on existing amenities and natural resources. For example, opponents of wind generated power argue that large wind turbines compromise pristine scenic views, kill birds and are excessively noisy. The merits of such claims aside, we can see that certain types of environmental policy may conflict with amenity development policy and so care must be taken when selecting the most appropriate mix of policies. In addition, developing amenities for recreation and tourism is not necessarily without negative environmental impacts as excessive development will potentially jeopardize the resources that were originally to be protected.²³

Outdoor Recreation Improving the Health of Iowans

In the Midwest, obesity rates among both rural and urban residents are higher than those of the United States in general. For example, the obesity rate for Midwestern persons living in a metro is 21.9 percent compared to the U.S. average of 19.1 percent. In non-metropolitan Midwestern counties the average is 22.9 percent compared to the U.S. average of 21.6 percent.²⁴ These data show that not only do Midwesterners tend to have a higher rate of obesity compared to the U.S. average, but that obesity rates are higher among rural residents than among their urban counterparts. The difference in obesity rates between rural and urban residents is most striking among men, whose the obesity rate is 18.7 percent in metropolitan areas versus 23.1 percent in non-metropolitan counties in the Midwest.

Recreating outdoors encourages physical activity that leads to improved health and physical well-being. Activities such as biking, hiking and swimming reduce the impact of the sedentary lifestyle that has become commonplace in our modern society.

²² “Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture.” *www.ipcc.ch* (last accessed Oct. 11, 2007).

²³ Dissart, J.C. and D.W. Marcouiller. 2005. “Impact of Outdoor Recreation Facilities on Remote Rural Income Growth,” in *Amenities and Rural Development: Theory, Methods, and Public Policy* edited by G.P Green, S. C. Deller, and D.W. Marcouiller, Edward Elgar, Northampton, MA.

²⁴ Urban and Rural Health Chartbook, 2001 (pg. 99) Available online at <http://www.cdc.gov/nchs/data/hus/hus01cht.pdf> (last accessed Sept. 19, 2007)

Offering Iowans more opportunities for outdoor recreation and promoting existing opportunities would encourage healthier lifestyles and foster a mindset towards reducing rates for adult and childhood obesity.

Determining the Value of Natural Resources and Outdoor Recreation Amenities – Net Economic Benefit (Consumer Surplus)

When determining the dollar value of a particular recreational activity or attempting to fix a value to a scenic or natural amenity, one problem that arises is the lack of a market in the traditional sense for the majority of these types of amenities. Unlike purchases in the grocery or department store, market prices for many recreational activities do not exist. However, to say that there is no market price for a particular amenity per se is not to say that this amenity has no value. To assign a value to these types of non-market goods, economists often use a combination of expenditures and what can be referred to as “net economic benefit” (often called consumer surplus by economists) to value various types of amenities.

Expenditures include direct, out-of-pocket expenses such as gas, food and lodging plus indirect costs such as the opportunity cost of time when traveling to and from a destination. In comparison, net economic benefit is the difference between the amount an individual would be willing to pay to enjoy a particular non-market amenity versus the actual costs incurred to obtain or enjoy that amenity.

To illustrate the concept of net economic value, Figure 7 presents an example of an individual who enjoys camping. In this scenario, the lower is the cost of each camping trip, the more camping trips the individual would like to take. That is, this individual’s demand for camping behaves the same as his demand for other goods that he consumes: when price goes up, fewer trips are demanded and when price goes down, more are demanded. In the example presented in Figure 7, the cost per trip is \$30 and includes all out-of-pocket expenses (fees, food, gas, etc.) plus the opportunity cost of travel (usually measured by the time required getting to and from the recreation destination multiplied by some fraction of an individual’s wage).

In this example, the individual wishes to take three trips. The total expenditures on camping will then be \$90 (3 trips x \$30/trip). However, the individual in our example is willing to pay up to \$50 per trip. The demand curve in Figure 7 shows that because this person is willing to pay \$50 for one trip but incurs only \$30 in expenses, he actually receives a net benefit. For a given number of trips taken and the expenditures

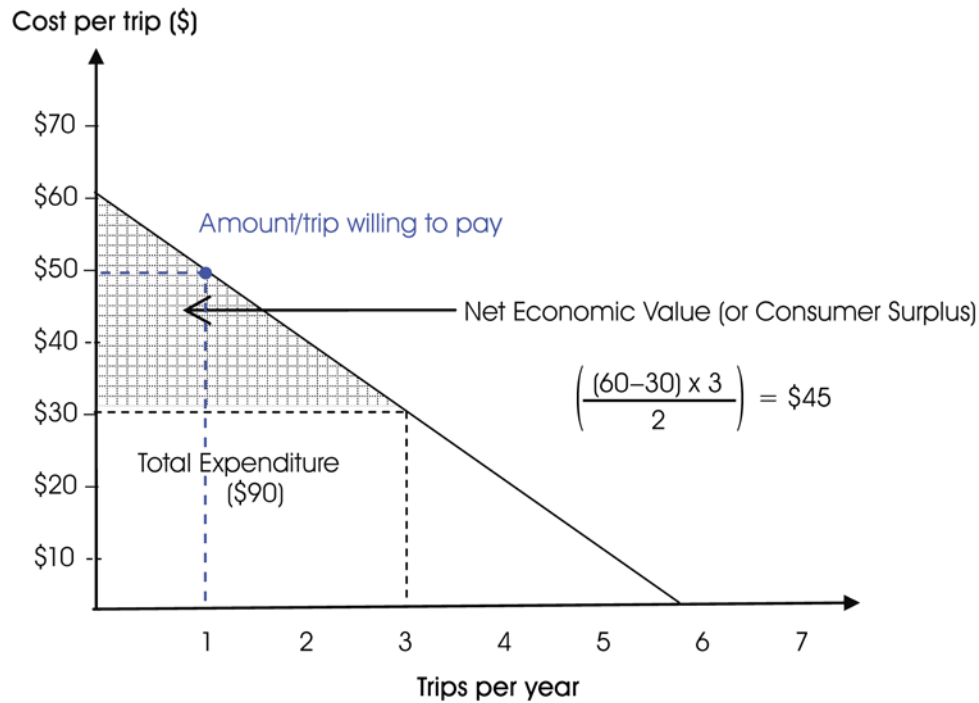


Figure 7. Demand for Camping and Net Economic Benefit

for those trips, net economic benefit is computed as the area above the price per trip but below the individuals demand curve—in Figure 7 this area is 45. Thus the net benefit to the individual camper is approximately \$45 from the three camping trips. Determining the value to society for an activity is done by summation of consumer surplus across all participants. For example, assuming that there are 1,000 campers and that all of them have the same demand curve for camping as that shown in Figure 7, the value to society of camping is \$45,000 (1,000 campers x \$45/camper).

Iowans Benefiting from Iowa’s Natural Resources and Outdoor Amenities

Natural Resources and Outdoor Amenities—What Iowa has to Offer

Even though Iowa was not endowed with a stretch of the Rocky Mountains or a sandy ocean beach, the state still offers considerable natural resources and opportunities for outdoor recreation. Among these opportunities are a large number of state parks, state forests, rivers, streams, lakes and trails that offer a variety of recreational and wildlife-related opportunities.

In recent years Iowa has devoted considerable attention to upgrading and improving many of the state parks in need of building, road and facility upgrades. In addition to maintenance of existing parks, two new state parks have been dedicated since 2001. Occupying 80 acres on the eastern shore of East Lake Okoboji,

the Elinor Bedell State Park opened in 2001 and provides numerous recreation opportunities for hiking, bicycle and roller-blade enthusiasts, as well as reintroduced prairies and wetlands that provide opportunities for wildlife viewers. More recently, Banner Lakes at Summerset State Park was added to the list of Iowa state parks in 2004. The location of the Banner Lakes addition was a 222-acre area on the site of a former coal mine that the Iowa Department of Natural Resources (DNR) purchased in 1954 as a wildlife management area. Prior to its conversion to a state park, the area had unfortunately been the site of illegal and dubious activities, making it a less than ideal location for outdoor recreationists and wildlife enthusiasts. In 2002 a plan was developed to transform this area into a state park. Part of this plan called for more recreation opportunities relating to angling, paths for biking and shoreline picnicking and fishing locations.

There are roughly 2.6 million acres of forest in Iowa with approximately 200,000 acres publicly owned as of 2002.²⁵ Of the public forest land, the state forest system in Iowa comprises 43,500 acres and offers a variety of recreational opportunities including hiking, picnicking, hunting, fishing and camping, as well as snowmobiling and horseback riding in designated areas. The Iowa DNR manages wildlife areas totaling more than 270,000 acres on 340 sites in the state.²⁶

Across the United States, 38% of the population age 16 years and older enjoyed some recreational activity relating to fish and wildlife in 2006.²⁷ During this year almost 34 million people spent time fishing and/or hunting and 71 million people engaged in wildlife-watching activities such as photographing wildlife. Equal to approximately 1% of the nation's gross domestic product, expenditures related to wildlife-related recreation totaled \$120 billion nationally in 2006, with sportspersons and wildlife watchers spending \$75 and \$45 billion, respectively. The West North Central region of the United States—which includes Iowa, Minnesota, Kansas, Missouri, Nebraska, and North and South Dakota—reports that 21% of the population engaged in fishing and 12% engaged in hunting activities in 2006, the highest of any region. This region also boasts the largest percentage of the population engaging in wildlife viewing activities with 42% taking part in around the home and 14% in away from the home wildlife viewing activities.

²⁵ Iowa DNR Annual Report, Fiscal Years 2001-2002. Available online at: <http://www.iowadnr.com/files/0102report.pdf> (last accessed Sept. 2007)

²⁶ Iowa DNR Web site <http://www.iowadnr.com/wildlife/wmamaps/pubhunt.html#public> (last accessed Sept. 19, 2007)

²⁷2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Fish & Wildlife Service (released July 2007).

On average, Iowans engage in more wildlife-related recreation than those in other states. Wildlife-related activities fall into one of three categories: wildlife viewing, fishing and hunting. In 2006, the total number of persons participating in some type of wildlife-related recreation was approximately 1.3 million and represents about 56% of the population in Iowa, considerably higher than the U.S. average of 38% by comparison.²⁸ In 2006 roughly 1.2 million Iowans engaged in some type of wildlife viewing for more than 4 million days.

In 2006 the participation rate of wildlife viewers in Iowa was among the highest in the nation at 48%. Iowa's participation rate was the same as the rates in Minnesota and Wyoming and was three percentage points higher than in neighboring Missouri (45%). Only the states of Maine, Montana and Vermont had a higher participation rate for wildlife viewing. It also appears that wildlife viewing as an activity has been taken up by an increasing number of Iowans. Between 2001 and 2006, the number of individuals age 16 years and older in Iowa engaging in wildlife watching increased from 1,028,000 to 1,111,000^{29,30}.

The next most popular wildlife activity is angling, which is enjoyed by approximately 450,000 individuals totaling more than 6 million angling days. Iowa boasts numerous angling opportunities both in terms of locations as well as species of fish. The Iowa

Table 1. Wildlife-Related Recreation by Activity (2006)

	Expenditures (thousands of dollars)	Number of Participants (thousands)	Number of Days (thousands)
Wildlife Watchers			
Total	304,209	1,206	4,016
Resident			3,654
Nonresident			362
Anglers			
Total	313,234	447	6,241
Resident			6,084
Nonresident			157
Hunters			
Total	296,500	213	3,912
Resident			3,691
Nonresident			221

Note: These figures are based on the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation by the U.S. Fish & Wildlife Service (released July 2007)

²⁸ 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Fish & Wildlife Service (released July 2007).

²⁹ http://library.fws.gov/nat_survey2001_economics.pdf (last accessed Sept. 22, 2007)

³⁰ 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Fish & Wildlife Service (released July 2007).

DNR lists more than 240 angling locations and 16 fish species statewide, ranging from catfish and largemouth bass to northern pike and walleye. Hunting is the third most practiced activity; 213,000 hunters occupied almost 4 million hunting days, less than half the number days spent angling.³¹

Natural Resources and Outdoor Amenities Generate Revenue and Support Local Employment

Participating in outdoor recreation typically involves expenditures such as travel, food, supplies and specialized equipment (e.g., bikes, fishing tackle, hunting equipment, licenses and special clothing). Identifying and measuring these expenses is one way to estimate the value people place on a particular recreational activity. Natural resources have value even when no expenditures are made while participating. Beyond what consumers actually spend to participate in a recreation activity, there is a surplus value of what they would actually be willing to pay for that recreation opportunity. This surplus is an important part of the valuation of the outdoor recreation experience and is important in assessing the value of the nearby recreation facilities that residents are able to use without incurring significant travel expenses.

This section focuses on identifying the expenditure impacts that are generated from residents and visitors spending money on outdoor recreational activities in Iowa. The economic impact will be identified by type of recreational resource and measured in terms of dollars spent, jobs supported and payroll generated. These measures provide an indication of the magnitude of the outdoor recreation industry in Iowa.

A series of consumer surveys on recreation patterns, along with data collected over the years on park visitation rates, facilitates the process of estimating the expenditure impacts of recreational activities in Iowa. The surveys have been directed at both special interest groups and visitors to specific recreational sites. The U.S. Fish and Wildlife Service conducts surveys every five years to collect state-specific information on recreational spending by individuals engaged in fishing, hunting and wildlife viewing. Occasional surveys at trails, parks and lakes in Iowa provide information on recreation and spending patterns at these sites. Most of the state parks obtain traffic counts of visitors entering parks. Overall, the most comprehensive information on recreation in Iowa appears to be the data captured at the sites where recreation occurs, rather than data obtained from participant groups of a particular outdoor recreation activity. Hence, this section is organized according to major sites where outdoor recreation in Iowa occurs.

³¹ Iowa Lake Fishing Guide 2004, <http://www.iowadnr.com/fish/fishing/2004LakeFishingGuide.pdf> (last accessed Sept. 19, 2007)

State Parks

The Iowa state park system consists of 85 parks across the state. (see Figure 8). Of these, 17 are managed by local county conservation boards with the balance being managed by the Iowa DNR. Recreation at state parks run the gamut of outdoor activities including hiking, biking, camping, picnicking, nature studies and, where lakes are available, fishing, boating and swimming. A fair amount of data is available on numbers of visitors to Iowa's state parks (see Table 2). Likewise, estimates of spending by visitors to parks are available from a number of sources.

The state park system collects data on the number of visitors to 56 of the larger state parks. The five-year pattern of visitation and camping for the 56 larger state parks is summarized across all uses and all seasons and totals include local visitors as well as visitors traveling longer distances. In 2006, an estimated 14 million persons visited Iowa state parks and roughly 668,000 camping parties (see Table 2).

The majority of visitors are expected to be local (within 30 miles of the park), which is consistent with a comprehensive study of state park visits conducted by Michigan State University's Department of Tourism Studies in 1997. This Michigan study also provides information on expenditure patterns broken down into spending categories, by local and nonlocal visitors and by type of visit. Per party spending in Michigan state parks was estimated at \$78 for camping and \$67 for day trips. We adapted this information to estimate the impacts associated with visits to Iowa's state parks.

The spending profile from the Michigan state parks is similar to the survey results from a 1999–2000 study of visitors to Saylorville Lake. Spending values in this study were estimated as \$45.53 per party for camping and \$41.77 per party for day trips. Similarly, the survey of users of Iowa lakes conducted in 2002 has generated comparable estimates of \$43 per party for day visitors and \$97 per day for overnight visiting parties. (The overnight spending by visitors to the two lakes included motel and camping.)

To estimate economic impact of visitors to Iowa state parks, we have updated the visitor expenditures to 2006 price levels. The estimates of total visitors and camping parties to Iowa state parks, based on counts provided by the Iowa DNR, are presented in the fourth and fifth columns of Table 2. Based on our assumptions of per party expenditures, we estimate total expenditures for day visitors and overnight campers in sixth and seventh columns of Table 2. Combined spending for the day and overnight visitors totals about \$748 million.

Table 2. Numbers of Visitors and Dollars Spent at Selected Iowa State Parks, 2001–2006

Park	County	Acres	Average no. of visitors 2001-06		Average expenditures in \$ 2001-06	
			Visitors	Camping parties	Visitors	Camping parties
A.A. Call	Kossuth	138	91,317	423	4,608,752	23,326
Backbone	Delaware	2,001	438,256	22,693	22,118,772	1,250,375
Badger Creek	Madison	270	67,058		3,384,434	
Beed's Lake	Franklin	1,417	157,450	13,936	7,946,502	767,855
Bellevue	Jackson	770	79,950	4,937	4,035,077	272,020
Big Creek	Polk	3,550	730,992		36,893,149	
Black Hawk	Sac	957	267,250	13,813	13,488,108	761,105
Bobwhite (Now County)	Wayne	390	56,695	391	2,861,397	21,544
Brushy Creek	Webster	6,000	545,467	17,405	27,529,703	959,006
Cedar Rock	Buchanan	400	8,436		425,748	
Clear Lake	Cerro Gordo	55	250,917	24,622	12,663,764	1,356,672
Dolliver	Webster	572	226,168	2,984	11,414,699	164,391
Elk Rock	Marion	2,218	152,445	10,204	7,693,908	562,250
Fort Defiance	Emmet	191	55,017	278	2,776,691	15,327
Geode	Henry	1,640	521,533	15,690	26,321,787	864,510
George Wyth	Black Hawk	494	631,470	17,932	31,870,291	988,044
Green Valley	Union	990	204,741	18,369	10,333,261	1,012,114
Gull Point Complex	Dickinson	732	1,237,500	69,552	62,456,625	3,832,288
Honey Creek	Appanoose	828	144,542	13,344	7,295,018	735,245
Lacey- Keosauqua	Van Buren	1,653	119,187	8,167	6,015,376	450,020
Lake Ahquabi	Warren	775	519,363	29,004	26,212,225	1,598,130
Lake Anita	Cass	942	232,242	15,269	11,721,237	841,331
Lake Darling	Washington	1,417	188,871	12,410	9,532,311	683,773
Lake Keomah	Mahaska	366	105,409	5,645	5,319,967	311,049
Lake Macbride	Johnson	2,180	487,325	13,647	24,595,293	751,950
Lake Manawa	Pottawattamie	1,529	1,238,457	18,686	62,504,916	1,029,589
Lake of Three Fires	Taylor	694	53,283	8,440	2,689,210	465,053
Lake Wapello	Davis	1,150	203,942	11,862	10,292,936	653,615
Ledges	Boone	1,250	412,792	21,610	20,833,595	1,190,702
Lewis and Clark	Monona	250	281,554	17,845	14,210,047	983,269
Maquoketa Caves	Jackson	266	198,553	11,584	10,020,987	638,288
McIntosh Woods	Cerro Gordo	278	315,700	7,988	15,933,379	440,120
Mines of Spain/E.B. Lyons	Dubuque	1,380	291,442		14,709,061	

Table 2. continued

Park	County	Acres	Average no. of visitors 2001-06		Average expenditures in \$ 2001-06	
			Visitors	Camping parties	Visitors	Camping parties
Nine Eagles	Decatur	1,100	54,928	3,814	2,772,199	210,133
Palisades-Kepler	Linn	1,020	252,000	8,980	12,718,440	494,798
Pikes Peak	Clayton	960	251,383	15,537	12,687,317	856,098
Pilot Knob	Hancock	700	135,167	4,048	6,821,862	223,026
Pine Lake	Hardin	572	249,506	17,307	12,592,543	953,607
Pleasant Creek	Linn	1,910	462,665	20,301	23,350,686	1,118,558
Prairie Rose	Shelby	422	96,658	15,277	4,878,346	841,781
Preparation Canyon	Monona	344	25,576	257	1,290,804	14,170
Red Haw	Lucas	649	202,317	6,883	10,210,956	379,244
Rock Creek	Jasper	602	168,000	32,300	8,478,977	1,779,712
Shimek Forest Camping	Lee and Van Buren	9,148	2,110	1,849	106,466	101,862
Springbrook	Guthrie	920	154,184	16,575	7,781,641	913,255
Stephens Forest Camping	Lucas	14,112	57,184	3,736	2,886,060	205,835
Stone Park	Plymouth	1,069	193,890	1,787	9,785,645	98,473
Union Grove	Tama	282	117,943	1,439	5,952,558	79,298
Viking Lake	Montgomery	1,000	318,083	24,234	16,053,666	1,335,315
Volga River	Fayette	5,400	89,350	4,694	4,509,495	258,658
Walnut Woods	Polk	260	85,058	4,012	4,292,894	221,043
Wapsipinicon	Jones	394	227,523	2,524	11,483,077	139,091
Waubonsie	Fremont	1,247	63,630	5,477	3,211,423	301,801
Wildcat Den & Fairport	Muscatine	417	221,795	10,284	11,193,968	566,621
Wilson Island	Pottawattamie	544	83,589	22,810	4,218,737	1,256,822
Yellow River Camping	Allamakee	8,503	60,683	15,165	3,062,688	835,601
Total:		89,318	14,088,541	668,017	\$711,048,673	\$36,807,759

Source: Iowa Department of Natural Resources

Direct expenditures by visitors to state parks have secondary impacts on the local economy as the money is recirculated and used to purchase additional goods and services. The magnitude of these secondary or multiplier impacts can be estimated using an input-output (I-O) model for the region with the park.³²

³² An I-O model is essentially a generalized accounting system of a regional economy that tracks the purchases and sales of commodities between industries, businesses and final consumers. Successive rounds of transactions stemming from the initial economic stimulus (such as a new plant or community business) are summed to provide an estimate of direct, indirect, induced (or consumer-

These I-O models can also be used to translate expenditures into jobs and income shares. Since tourism spending involves mostly retail and service sectors, we need to make appropriate adjustments to expenditure totals to include only margins generated in the local economy. The production costs of retail goods manufactured elsewhere but sold locally are adjusted in the IMPLAN® model to reflect only the local margins. The results of the I-O analysis of state park spending are presented in Table 3. The results indicate an estimated 8,787 jobs and \$185.9 million of personal income are directly or indirectly linked to recreational spending at Iowa’s state parks.

County Parks

The system of county parks maintained and operated by the County Conservation Boards (CCB) is another major natural resource for Iowans. The size of these holdings in each county typically range from a few acres of habitat preservation to more sizeable holdings with features that compare to state parks (see Table 4). The CCB listing of county park holdings totals 176,385 acres of land and facilities in 1,722 different parks.³³

Table 3. Economic Value of Spending at State Parks in Iowa

Sector	Total margined sales	Labor income	Value added to GDP	Jobs
Agriculture	\$23,299,310	\$1,777,622	\$15,741,006	42
Construction and utilities	\$12,352,899	\$3,282,671	\$7,395,336	58
Manufacturing	\$23,973,122	\$3,904,390	\$6,041,537	87
Transportation & utilities	\$8,206,067	\$3,957,031	\$4,880,190	102
Wholesale & retail trade	\$153,479,968	\$56,152,536	\$94,613,256	2,745
Finance, insurance & real estate	\$30,456,254	\$7,630,280	\$19,284,330	222
Professional services	\$36,462,024	\$17,436,102	\$20,875,488	465
Other services	\$267,130,720	\$91,775,832	\$156,441,424	5,067
Total	\$1,184,694,653	\$185,916,464	\$325,272,566	8,787

Source: IMPLAN® model for Iowa

related) and total effects of the event. The impacts are calculated using the IMPLAN® Input-output modeling system, originally developed by the U.S. Forest Service and currently maintained by the Minnesota IMPLAN® Group. This modeling system is widely used by regional scientists to estimate economic impacts. (Appendix A).

³³ 2007 Iowa County Conservation Board *Guide to Outdoor Adventure* (released January 2007).

Table 4. County Park Holdings, Estimated Visits and Estimated Expenditures by County

County	Acres	Estimated visits	Estimated expenditures (\$)	County	Acres	Estimated visits	Estimated expenditures (\$)
Adair	853	148,186	3,739,470	Jefferson	1,361	89,332	2,254,287
Adams	2,151	35,778	902,852	Johnson	1,475	534,402	13,485,641
Allamakee	158	127,113	3,207,684	Jones	2,670	202,760	5,116,642
Appanoose	1,088	117,268	2,959,267	Keokuk	2,266	184,092	4,645,574
Audubon	651	53,716	1,355,532	Kossuth	1,591	91,317	2,304,376
Benton	1,355	415,286	10,479,744	Lee	1,841	359,580	9,073,996
Black Hawk	8,138	580,345	14,645,018	Linn	6,881	714,665	18,034,563
Boone	1,039	412,792	10,416,798	Louisa	2,329	198,068	4,998,235
Bremer	3,681	182,455	4,604,259	Lucas	1,945	181,571	4,581,936
Buchanan	2,441	206,688	5,215,773	Lyon	1,921	191,864	4,841,680
Buena Vista	1,114	197,948	4,995,207	Madison	2,404	128,818	3,250,717
Butler	1,417	84,029	2,120,482	Mahaska	1,361	218,011	5,501,518
Calhoun	624	172,583	4,355,123	Marion	3,412	320,808	8,095,587
Carroll	2,427	205,235	5,179,095	Marshall	1,555	386,769	9,760,117
Cass	624	122,867	3,100,537	Mills	512	83,851	2,115,979
Cedar	880	266,153	6,716,381	Mitchell	1,981	179,097	4,519,506
Cerro Gordo	3,024	440,873	11,125,441	Monona	545	181,776	4,587,121
Cherokee	1,118	203,586	5,137,487	Monroe	94	146,859	3,705,998
Chickasaw	1,521	108,794	2,745,407	Montgomery	824	186,084	4,695,836
Clarke	597	172,304	4,348,101	Muscatine	1,306	416,670	10,514,677
Clay	1,080	94,054	2,373,460	O'Brien	621	124,262	3,135,745
Clayton	905	266,678	6,729,626	Osceola	1,812	56,242	1,419,275
Clinton	1,891	488,291	12,322,015	Page	628	90,597	2,286,226
Crawford	1,113	94,367	2,381,339	Palo Alto	2,242	182,673	4,609,751
Dallas	3,085	485,539	12,252,587	Plymouth	2,161	193,890	4,892,823
Davis	396	162,590	4,102,951	Pocahontas	2,275	151,549	3,824,330
Decatur	2,687	159,507	4,025,164	Polk	11,770	816,050	20,593,022
Delaware	2,055	263,412	6,647,212	Pottawattamie	1,661	803,919	20,286,896
Des Moines	1,525	400,026	10,094,653	Poweshiek	2,006	277,540	7,003,727
Dickinson	463	92,956	2,345,742	Ringgold	803	43,762	1,104,322
Dubuque	2,218	819,811	20,687,924	Sac	907	176,778	4,461,003
Emmet	298	173,121	4,368,718	Scott	2,509	580,178	14,640,797
Fayette	1,149	207,906	5,246,504	Shelby	712	109,930	2,774,096
Floyd	1,605	92,192	2,326,466	Sioux	1,929	315,070	7,950,803
Franklin	1,816	175,195	4,421,041	Story	2,450	724,352	18,279,031
Fremont	210	144,487	3,646,125	Tama	711	261,677	6,603,429
Greene	1,599	164,060	4,140,065	Taylor	539	55,398	1,397,958
Grundy	801	202,116	5,100,408	Union	3,790	195,798	4,940,969
Guthrie	968	189,154	4,773,290	Van Buren	496	144,038	3,634,810
Hamilton	1,574	90,748	2,290,025	Wapello	1,159	350,494	8,844,712
Hancock	1,125	192,664	4,861,867	Warren	1,732	416,700	10,515,418
Hardin	3,130	264,623	6,677,749	Washington	2,097	209,183	5,278,721
Harrison	1,316	88,211	2,226,006	Wayne	1,354	54,611	1,378,103
Henry	859	198,949	5,020,485	Webster	1,050	384,664	9,706,996
Howard	2,146	183,719	4,636,151	Winnebago	2,490	185,970	4,692,952
Humboldt	407	163,979	4,138,005	Winneshiek	751	208,083	5,250,965
Ida	574	61,592	1,554,285	Woodbury	5,195	474,636	11,977,440
Iowa	1,577	89,376	2,255,413	Worth	2,531	144,132	3,637,168
Jackson	1,995	199,008	5,021,972	Wright	1,939	117,544	2,966,222
Jasper	2,327	369,292	9,319,092	Total	176,385	23,677,737	\$597,507,696

Unlike state parks, the county parks do not track visitor numbers, although Polk County officials offered a rough estimate of 1.5 million total visitors to their system of county parks. Because many of the features of county parks are comparable to the state parks, we use the attributes of county population and total park acreage as a weighting scheme to estimate the number of visitors to county parks. The Polk County estimate of 1.5 million visitors serves as an estimate for urban areas. The relationship to the population base observed for visitation patterns to state parks in urban counties is then compared to that of state parks in rural counties. Using these assumptions, we estimated total annual visits to county parks to be 23.7 million visitor parties.

Information to estimate expenditures at county parks is sparse. The attributes of some county parks rival those of some state parks, but not in all cases. County parks are intended to better serve local markets, so we would anticipate shorter, less elaborately planned visits and lower levels of expenditure on refreshments and supplies. If we assume expenditure levels per visit of about one half of those at state parks, annual expenditures still total \$600 million.

The secondary impact of visitor spending at Iowa’s county parks can be estimated using the same I-O methods. The results of this analysis are presented in Table 5 and indicate that an estimated 7,020 jobs and \$259.9 million of income are supported by this level of spending by visitors to the county parks.

City Parks

City parks are another significant outdoor resource in Iowa. Often these parks receive state dollars for maintenance and improvements. However, there is no centrally available source of information on size and amenities of city parks in Iowa, making it

Table 5. Economic Value of Spending at County Parks in Iowa

Sectors	Total Margined Sales	Labor Income	Value Added to GDP	Jobs
Agriculture	\$18,623,915	\$1,420,913	\$12,582,311	33
Construction & utilities	\$9,874,084	\$2,623,948	\$5,911,339	46
Manufacturing	\$19,162,516	\$3,120,909	\$4,829,202	70
Transportation & utilities	\$6,559,383	\$3,162,987	\$3,900,899	82
Wholesale & retail trade	\$122,681,654	\$44,884,594	\$75,627,529	2,194
Finance, insurance & real estate	\$24,344,699	\$6,099,137	\$15,414,608	178
Professional services	\$29,145,311	\$13,937,258	\$16,686,473	371
Other services	\$213,526,489	\$73,359,482	\$125,048,845	4,050
Total	\$946,965,926	\$148,609,227	\$260,001,204	7,024

Source: IMPLAN® model for Iowa

beyond the scope of this project to inventory and value this resource. As a local resource, these parks can be heavily used by residents. Local parks have an economic value even though per capita spending per visit may be lower than at state and county parks.

Many local government projects are supported with the assistance of the DNR's Resource Enhancement and Protection (REAP) program (<http://www.iowadnr.com/reap/>). REAP-funded projects in the city of Ames can be used to illustrate the impact of these local projects. Metered visitor counts conducted at several locations in Ames estimated user traffic along a segment of trails around Ada Hayden Lake. During a 30-day period in June and July 2007, an estimated 7,000 people used the trails. Picnickers and fishers were not included. Adjusting for seasonality, approximately 40,000 visitors use the trails around Ada Hayden Lake in Ames each year.

Trails

While hiking trails tend to be an integral part of state and local parks above a certain size, any expenditures associated with hiking in state, county or city parks are subsumed within the overall usage figures for these parks. This trail section reports on a special class of multiuse trails of more than five miles in length. The listing is maintained by the Iowa Natural Heritage Foundation and the Iowa DOT (See Figure 9). The list changes frequently as trail sections are expanded and upgraded.

The impact of a trail depends on the type of activity taking place on that trail. Multiuse trails can accommodate biking, hiking and cross-country skiing. A limited number of trails can also accommodate horses. The list of multipurpose trails indicates that these trails are fairly widely dispersed throughout Iowa and are frequently part of a rails-to-trail right of way. The entire set of multiuse trails in the system consists of 890 miles of paved and packed cinder or gravel trails.

Trail usage is not closely monitored, but information from several sources is available to provide an estimate of overall trail use and expenditures. Trail volunteers and park boards in Polk and Black Hawk Counties did visitor counts that were used to estimate annual visits to several trails. These estimates of use were based on the population of the county with the trail and the length of the trail to arrive at a population-weighted estimate of trail users per mile. The county population to trail use ratios for these two counties were similar and provided a method to estimate trail use throughout the state. The third column in Table 6 contains the results of this estimation method for

the 57 trails in Iowa. In aggregate, an estimated 1.4 million people used the trails annually.

The volunteer teams in Black Hawk County also did a short survey of the spending patterns of trail visitors for 2003. Information on durable goods and equipment was incomplete, but small item purchasing (food, beverages, misc. supplies) totaled roughly \$8 per person in 2006 dollars. This spending level is comparable to the amount reported by trail users of the Heritage Trail in Pennsylvania in a 2003 study. Therefore, we felt comfortable using an \$8 per person spending value to estimate the impact of spending by users of the Iowa trail system. Column four in Table 6 presents our estimate of nearly \$11 million in aggregate expenditures by trail users in 2006.

Again, I-O methods can be used to estimate the total direct and indirect impacts associated with trail users in Iowa. The results of this analysis, presented in Table 7, indicate that spending by trail users supports 128 jobs, \$2.7 million of income and \$4.75 million of gross state product.

Lakes

Iowa lakes are a precious natural resource, in part because they are so few. The DNR inventories a list of 132 natural and manmade lakes covering 324,000 acres of surface area in Iowa. Figure 10 illustrates where the lakes are located.

The recreational value of these 132 lakes has been recently studied Kling and Herriges, et al.³⁴). A statewide survey of Iowans on their patterns of lake use provides the estimated numbers of one-day and multiple-day visits to Iowa lakes. A separate expenditure survey conducted in summer 2002 at Storm Lake and Rock Creek Lake provides the estimated per party expenditures for these two types of visitors. The per party spending, estimated at \$43 for day visitors and \$97 for overnight visitors, is used to drive our estimate of overall spending at Iowa lakes. Table 8 presents the estimate of \$977 million of total annual spending at the 132 Iowa lakes (~\$403 million for one-day visitors and ~\$574 million for multiple-day visitors).

The value of benefits reported in this study of lakes overlaps somewhat with state park estimates in cases where the lakes are part of a state or county park. As a result,

³⁴ Christopher D. Azevedo, Kevin J. Egan, Joseph A. Herriges, and Catherine L. Kling, Iowa Lakes Valuation Project: Summary and Findings from Year One, CARD Report, Aug. 2003. <http://www.card.iastate.edu/environment/items/IowaLakesReport.pdf>

Table 6. Estimated Trail Use and Expenditures in 2006

Trail	Miles	Estimated Trail Usage	Estimated Expenditures (\$)
Cedar Valley lakes Trails Network	80	122,646	981,165
Cedar valley Nature Trail	52	79,720	637,757
Chichaqua Valley Trail	20	30,661	245,291
Cinder Path	14	21,463	171,704
Clive Greenbelt Trail	9	13,031	104,249
Davenport Mississippi River Trail and Duck Creek Parkway	12	19,010	152,081
Four Mile Greenway Trail	5	7,665	61,323
Great Western/Bill Riley Trails	11	16,864	134,910
Heart of Iowa Nature Trail	19	28,515	228,121
Heritage Trail	17	26,062	208,498
Hoover Nature Trail	26	39,860	318,879
Iowa Great Lakes Trail	24	36,794	294,350
Iowa River Corridor	20	30,661	245,291
Jordan Creek Trail	6	9,198	73,587
Kewash Nature Trail	12	18,397	147,175
Linn Creek Greenbelt Parkway	14	21,156	169,251
Neal Smith Trail	10	15,116	120,929
John Pat Dorrian Trail	26	39,860	318,879
Pioneer Trail	2	3,373	26,982
Prairie Farmer Recreational Trail	12	18,397	147,175
Raccoon River Valley Trail	20	30,661	245,291
River City Greenbelt	56	85,852	686,816
Sauk Rail Trail	18	26,829	214,630
Sioux City River Trails	33	50,591	404,731
Summerset Trail	12	18,780	150,241
Three Rivers Trail	11	16,864	134,910
Volksweg Trail	33	50,591	404,731
Wabash Trace Nature Trail	13	19,930	159,439
Wapsi-Great Western Line	63	96,583	772,668
Waverly Rail Trail	12	18,397	147,175
Amana Kolonieweg Trail	12	18,397	147,175
Cedar River Greenbelt/Harry Cook	3	4,906	39,247
Comet Trail	7	10,272	82,173
Clinton Discovery Trail	7	10,731	85,852
Fort Dodge Nature Trail	5	7,359	58,870
Jackson County Recreational Trail	4	5,826	46,605
Jefferson County Trail System	4	5,672	45,379
Old Creamery Trail	6	9,198	73,587
Rock Island/Old Stone Arch	15	22,996	183,968
Sac and Fox Trail	4	6,132	49,058
Shell Rock River Trail	7	11,038	88,305
Spencer Recreational Trail	13	19,930	159,439
Storm Lake Trail	5	7,665	61,323
Grant Wood Recreation Trail	5	7,665	61,323
Twin Lakes Trails	4	5,366	42,926
Cedar River Trails	12	17,630	141,042
Lake Manawa Trail	11	16,557	132,457
	5	7,665	61,323

Table 6. Continued

Trail	Miles	Estimated Trail Usage	Estimated Expenditures (\$)
Mahaska Community Recreation Trail	12	18,627	149,014
Mississippi Riverfront Trail	5	7,665	61,323
North Ridge-North Liberty Trail	5	7,665	61,323
Rock Creek Recreational Trail	6	9,198	73,587
Rolling Prairie Trail	6	9,198	73,587
Solon Trail	5	7,665	61,323
Ames Trail System	44	67,455	539,641
T-Bone Trail	11	16,864	134,910
Trolley Trail	8	12,265	98,117
Total	890	1,365,138	\$10,921,104

Table 7. Economic Value of Spending at Trails in Iowa

Sectors	Total sales	Labor income	Value added to GDP	Jobs
Agriculture	\$340,170	\$25,953	\$229,819	1
Construction & utilities	\$180,352	\$47,927	\$107,972	1
Manufacturing	\$350,008	\$57,004	\$88,206	1
Transportation & utilities	\$119,809	\$57,773	\$71,251	1
Wholesale & retail Trade	\$2,240,808	\$819,827	\$1,381,354	40
Finance, insurance & real estate	\$444,661	\$111,402	\$281,551	3
Professional services	\$532,346	\$254,567	\$304,782	7
Other services	\$3,900,109	\$1,339,927	\$2,284,045	74
Total	\$17,296,542	\$2,714,380	\$4,748,979	128

double counting occurs when totaling the estimated numbers of economic benefits from parks with those from lakes.

While we need to be mindful that there is some double counting combining lake visits with other types of outdoor recreation, we use these visitor numbers to estimate the secondary effects associated with spending by visitors to Iowa lakes. The results of this I-O analysis, presented in Table 9, indicate that an estimated 11,479 jobs, \$242.9 million of income and \$424.9 million of gross state product are associated with the spending by visitors to Iowa lakes.

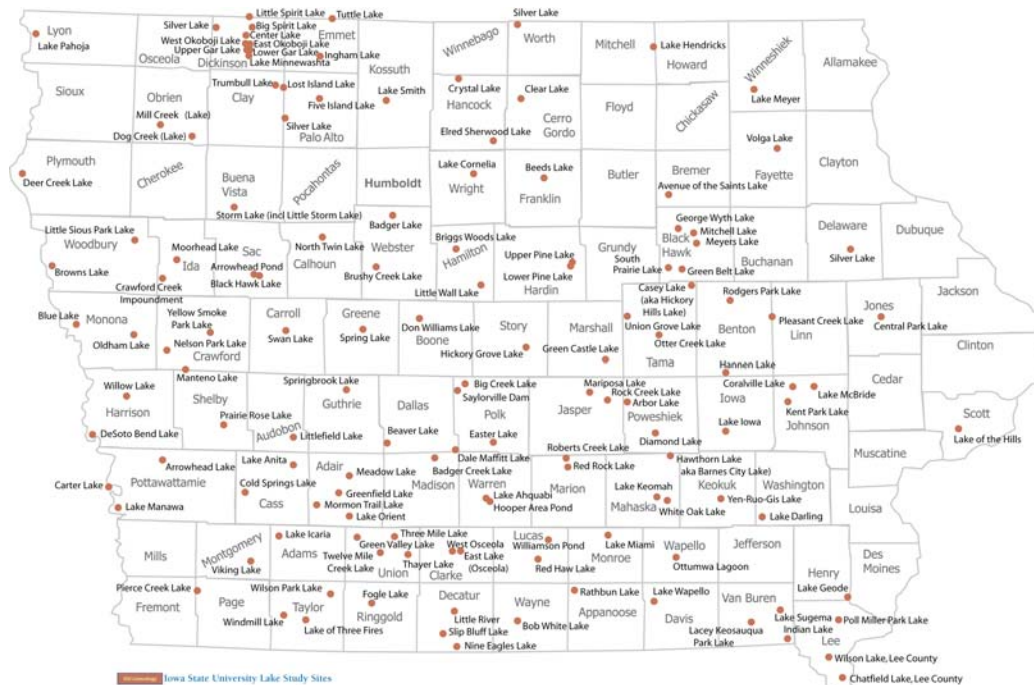


Figure 10. Location of Selected Iowa Lakes

Rivers

Study of the use of rivers for outdoor recreation is only beginning. The coastal rivers are of a much larger scale and provide economic value through recreational and commercial opportunities. While river recreation on Iowa’s interior rivers has not been widely studied, several studies on recreation and wildlife viewing along the Mississippi River have been conducted by the U.S. Fish and Wildlife Service. Segments between the various locks and dams along the Mississippi were identified and values estimated. We divided the benefits along the 312 miles of river coast in Iowa by two in order to arrive at an estimate of Iowa’s share of the values. Table 10 presents a summary of Iowa’s share of these values in terms of expenditure, income and jobs. Iowa’s portion of the benefit from fishing and wildlife recreation activities along the Mississippi are \$36.4 million in expenditures, 534 jobs and \$9.75 million in income. Similar outdoor recreation activities take place along Iowa’s major interior rivers and reservoirs although no surveys have documented the levels of expenditures associated with those activities.

Net Economic Benefit of Natural Resource and Outdoor Amenities to Iowans

Obtaining estimates of the net economic benefit of different types of recreational activities that Iowans enjoy in the state would require collecting and analyzing a considerable amount of data, a process that would be both time consuming and

Table 8. Single- and Multiple-day Trips to Iowa Lakes in 2002

Lake Name	Single-day trips 2002	Multiple-day trips 2002	Lake Name	Single-day trips 2002	Multiple-day trips 2002
Arbor	1,348,555	2,819,742	Pahoja	706,900	3,400,873
Arrowhead	1,774,381	2,147,799	Smith	1,104,585	6,891,251
Arrowhead	375,520	89,179	Sugema	2,300,485	2,326,810
Ave. of the Saints	740,052		Wapello	2,725,926	4,000,950
Badger Creek	3,272,171	984,231	Little River	967,735	1,718,239
Badger	3,477,687	3,132,357	Little Sioux Park	927,836	536,705
Beaver	1,038,280	984,231	Little Spirit	2,517,470	2,416,315
Beed's	3,505,925	1,831,264	Little Wall	2,523,252	2,147,799
Big Creek	18,415,297	5,155,045	Littlefield	913,525	3,400,873
Spirit Lake	8,778,329	33,894,395	Lost Island	4,097,321	8,681,355
Black Hawk	4,435,351	16,781,253	Lower Gar	2,875,305	2,326,810
Blue	1,669,431	1,879,283	Lower Pine	2,539,491	1,749,926
Bob White	315,768	536,705	Manteno Pond	143,597	357,694
Brigg's Woods	2,297,931	1,073,736	Mariposa	1,100,634	178,684
Brown's	2,331,469	805,221	Meadow	176,701	
Brushy Creek	5,722,998	2,401,289	Meyers	1,369,661	89,179
Carter	2,351,322	596,484	Mill Creek	640,643	626,210
			Mitchell		
Casey	1,529,689	3,758,894	Impoundment	730,463	89,179
Center	738,462	2,237,304	Moorehead	694,275	268,189
Central	2,369,344	4,281,879	Mormon Trail	862,784	
Clear	16,743,264	32,561,943	Nelson Park	463,894	626,210
Cold Springs	1,280,371	894,726	Nine Eagles	660,544	1,503,296
Coralville	19,357,397	24,226,849	North Twin	3,111,516	13,189,284
Crawford Creek	640,643	954,505	Oldham	198,819	89,179
Crystal	2,037,963	1,163,242	Otter Creek	828,427	596,811
			Ottumwa		
Dale Maffit	2,175,825	178,684	Lagoon		
DeSoto Bend	2,613,458	536,705	(proper)	4,026,920	4,315,851
Diamond	1,673,093	2,386,589	Pierce Creek	397,637	178,684
Dog Creek	476,712	1,252,747	Pleasant Creek	7,093,864	9,043,950
Don Williams	3,982,829	5,996,525	Pollmiller	1,435,966	536,705
East Osceola	1,981,055	536,705	Prairie Rose	1,680,947	1,738,819
East Okoboji	12,901,381	46,351,304	Rathbun	9,285,591	23,138,739
Easter	5,808,530	894,726	Red Haw	1,839,000	894,726
Eldred Sherwood	522,537	178,684	Red Rock	14,936,212	27,485,623
Five Island	2,789,195	2,774,336	Robert's Creek	1,442,616	2,899,774
Fogle	277,700	357,694	Rock Creek	2,908,650	4,506,948
George Wyth	8,659,307	2,286,957	Rogers	804,767	2,349,349
Green Belt	670,085	402,447	Saylorville	29,258,332	23,404,968
Green Castle	705,984	89,179	Silver	2,043,986	626,210
Green Valley	2,471,018	4,078,042	Silver	520,706	89,179
Greenfield Lake	684,927	178,684	Silver	374,749	178,684
Hannen	2,234,180	9,414,057	Silver	1,557,445	178,684
Hawthorn	2,583,726	2,058,294	Slip Bluff	90,206	
Hickory Grove	3,196,180	4,474,936	South Prairie	2,086,584	
Hooper	530,199		Spring	1,230,208	3,937,904
Indian	727,717	805,221	Springbrook	2,129,711	4,401,110
Ingham	1,202,501	5,584,605	Storm Lake	7,124,848	3,835,006
Kent Park	4,080,986	2,774,336	Swan	4,694,259	5,083,506
Lacey-Keosauqua	2,810,493	3,669,388	Thayer	252,450	357,694
			Three Mile	4,483,249	10,503,147

Table 8 Continued

Lake Name	Single-day trips 2002	Multiple-day trips 2002	Lake Name	Single-day trips 2002	Multiple-day trips 2002
Ahquabi	4,092,117	4,564,441	Trumbull	972,024	
Anita	2,159,827	3,448,565	Tuttle	565,616	5,728,009
Cornelia	2,388,425	3,937,904	Twelve Mile	3,094,073	2,461,721
Darling	3,428,392	2,040,328	Union Grove	1,501,211	
Geode	4,426,292	4,027,409	Upper Gar	2,811,023	5,481,706
Hendricks	684,349	1,879,283	Upper Pine	3,260,654	2,088,020
Icaria	2,902,096	5,907,020	Viking	2,059,406	984,231
Iowa	1,557,252	3,937,904	Volga	2,765,728	1,431,757
Keomah	2,129,759	1,521,263	West Okoboji	16,776,176	65,500,526
Manawa	8,591,412	2,595,325	West Osceola	1,976,621	536,705
Macbride	12,853,532	9,432,677	White Oak	254,523	
Miami	1,718,822	2,237,304	Williamson Pond	357,883	
Minnewashata	2,077,091	596,484	Willow	624,886	894,726
Lake of The Hills	2,993,459	6,639,068	Wilson	197,421	
Three Fires	1,366,914	1,342,252	Windmill	309,263	715,715
Orient	712,441	1,789,778	Yellow Smoke	2,453,815	2,684,831
			Total	\$403,250,410	\$573,754,428

Source: Iowa Department of Natural Resources

Table 9. Economic Value of Spending at Lakes in Iowa

Sectors	Total Sales	Labor Income	Value added to GDP	Jobs
Agriculture	\$30,438,219	\$2,322,285	\$20,564,050	54
Construction & utilities	\$16,137,827	\$4,288,481	\$9,661,267	75
Manufacturing	\$31,318,487	\$5,100,695	\$7,892,664	114
Transportation & utilities	\$10,720,406	\$5,169,465	\$6,375,480	134
Wholesale & retail trade	\$200,506,230	\$73,357,673	\$123,602,758	3,586
Finance, insurance & real estate	\$39,788,050	\$9,968,198	\$25,193,049	290
Professional services	\$47,633,988	\$22,778,524	\$27,271,738	607
Other services	\$348,979,573	\$119,895,947	\$204,375,076	6,620
Total	\$1,547,685,095	\$242,881,269	\$424,936,080	11,479

Source: IMPLAN® model for Iowa

Table 10. Expenditures, Income and Jobs to Iowa from Recreation on and along the Mississippi River (2006 dollars)

Activity	Expenditures	Output	Jobs	Job Income
Wildlife observation	40,852	49,984	1	10,821
Small game hunting	127,602	157,794	2	36,319
Big game hunting	1,156,693	1,428,355	18	322,963
Migratory bird hunting	7,531,339	9,223,864	114	2,067,504
Fishing	8,829,213	10,762,695	123	2,303,119
Refuge Totals	18,720,378	22,887,904	277	5,013,569
Total	\$36,406,077	\$44,510,597	534	\$9,754,295

costly.³⁵ Fortunately, there is much literature on valuing recreational amenities ranging from wildlife viewing and hiking to fishing and big game hunting. Between the years 1967–2003, John Loomis, Professor at Colorado State University, summarized the findings of 1,239 reports that compute consumer surplus (i.e., net economic benefit) for a wide variety of recreational activities across the entire United States.³⁶ This can be used to understand the net economic value of different recreational activities and to obtain an estimate of the values of these activities to Iowans.

Using estimates from other studies to value amenities in Iowa requires that the conditions under which the original analysis was done (i.e., region of study, sample population, quality of amenities being considered, etc.) be substantively similar to the activities for which we would like to obtain estimates. Unfortunately, the number of studies that have valued different types of amenities in Iowa is limited. Furthermore, it is not always clear how closely estimates of net economic benefit associated to a particular activity in Iowa compares with those in other areas in the United States. For example, scenic amenities associated with camping in Colorado might very well result in higher net economic benefit per day of camping than in Iowa. However, the net economic benefit from a day fishing or viewing wildlife in Iowa may not substantially differ from that same activity if it were enjoyed in another state. To this end, it is feasible to use estimated values from previous research when inferring amenity values, but care needs to be taken when interpreting the figures obtained from such extrapolation.

Figure 11 illustrates the geographic classification used by Loomis and classifies Iowa in the Northeast Region, bordering the Intermountain Region. Estimates of net economic benefit for a variety of recreation activities are drawn from previous studies relating to either of these regions to infer values for activities in Iowa.

³⁵ Two common methods used in the economics literature are the travel cost method and the contingent valuation method. The travel cost method involves collecting data from a sample of visitors at a given recreation site and using this data to estimate a demand function that is then used to determine a value for consumer surplus. An alternative method is the contingent valuation method, in which a combination of elements from the travel cost model and individual responses to hypothetical questions on amenity use are used to estimate consumer surplus values. The travel cost method alone is appropriate primarily for valuing amenities that already exist, whereas the contingent valuation method is better suited to estimating benefits to proposed developments or planned improvements to existing sites.

³⁶ Loomis, John. 2005. “Updated Outdoor Recreation Use Values on National Forests and Other Public Lands,” United States Department of Agriculture, General Technical Report #PNW-GTR-685, (October), 34 pgs.

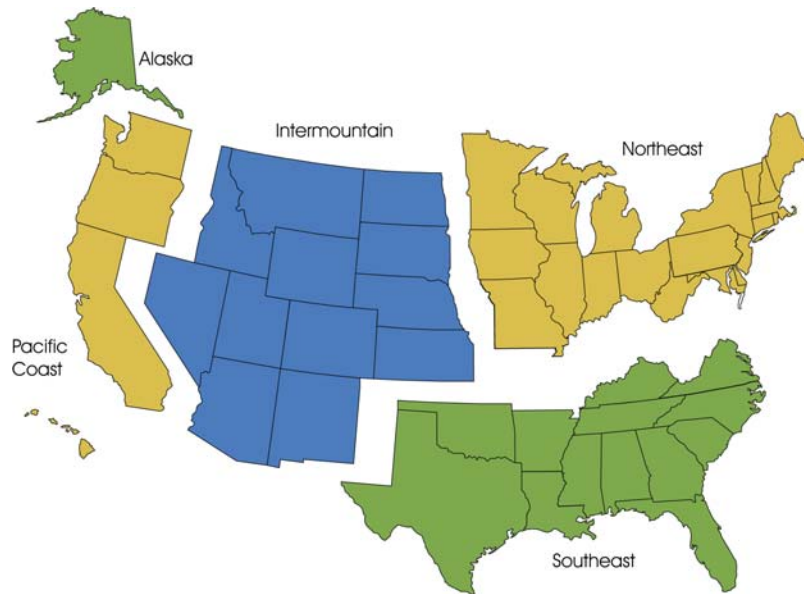


Figure 11. Regions of Study in the Loomis Report (2005)

A summary of the estimates for a variety of different recreation activities are given in Table 11 for both the Northeast and Intermountain Regions and represent dollar values of net economic benefit per day of recreation activity. The top section of Table 11 shows the average net economic benefit based on 540 estimates from the recreation literature from the Northeast and Intermountain Regions combined. For example, the net economic benefit from one day of camping is equal to approximately \$37 based on an average of 31 studies. The net economic benefit per day of fishing is an average \$42 based on 117 studies. The average based on 126 studies is for wildlife viewing \$36 per day. For hunting the average net economic benefit is \$51 per day based on 196 studies.

The middle section of Table 11 displays average values for the various activities based on 287 estimates from the Northeast Region, the region that includes Iowa. Based on the research conducted in this region, the average estimated consumer surplus per day of camping and fishing is approximately \$35 each, \$51 for hunting, and \$33 for wildlife viewing. In general, the average net economic benefit tends to be lower for the Northeast Region than the Intermountain Region that borders Iowa (bottom section of Table 11). Generally speaking, higher values of amenities in the Intermountain Region are likely due in part to higher levels of scenic beauty in Rocky Mountain states such as Colorado, Wyoming, and Montana.

Determining the aggregate net benefit of outdoor recreation amenities in Iowa requires that the consumer surplus for each of the activities be totaled for all users in

Table 11. Estimates of Net Economic Benefit for Various Recreation Activities

Activity	Average	Standard deviation	Minimum	Maximum	Number of studies
Estimates based on Intermountain and Northeast Regions					
Boating (non-powered)	72.12	64.56	2.70	316.40	28
Boating (powered)	46.48	60.80	3.78	203.61	10
Camping	34.20	27.17	2.03	116.67	31
Fishing	39.57	47.08	2.08	253.13	117
General Recreation	39.17	62.55	1.97	257.51	17
Hunting	48.07	36.11	2.60	250.89	196
Mountain Biking	163.97	106.63	40.93	295.70	7
Swimming	23.13	15.27	2.18	50.10	8
Wildlife Viewing	34.17	22.03	2.40	193.91	126
Estimates based on Northeast Region					
Boating (non-powered)	88.32	56.17	20.08	143.49	6
Boating (powered)	29.68	43.67	3.78	80.10	3
Camping	33.11	19.99	6.73	66.44	10
Fishing	32.91	45.32	2.08	253.12	69
General Recreation	16.88	18.06	1.97	46.69	5
Hunting	47.45	37.65	4.16	250.89	87
Mountain Biking	40.93	-	40.93	40.93	1
Swimming	22.22	16.25	2.19	50.10	7
Wildlife Viewing	31.29	17.57	2.40	96.30	65
Estimates based on Intermountain Region					
Boating (non-powered)	67.70	67.18	2.70	316.41	22
Boating (powered)	53.67	68.61	5.28	203.61	7
Camping	34.72	30.44	2.03	116.67	21
Fishing	49.57	48.22	8.96	227.28	48
General Recreation	48.46	72.47	7.91	257.51	12
Hunting	48.56	35.01	2.60	169.30	109
Mountain Biking	184.48	100.55	65.87	295.70	6
Swimming	29.54	-	29.54	29.54	1
Wildlife Viewing	37.23	25.75	5.25	193.91	61

Note: All values are per activity day in 2007 dollars. These estimates are based on Loomis, John. 2005. "Updated Outdoor Recreation Use Values on National Forests and Other Public Lands," United States Department of Agriculture, General Technical Report #PNW-GTR-685, (October), 34 pgs.

the state. An approximate net economic benefit is calculated by multiplying the number of occurrences for an activity by the average benefit from the Loomis report, since more specific estimates for Iowa are beyond the scope of this study. The resulting number represents the aggregate net economic benefit of that particular activity to the state. The total net benefit of natural resource and outdoor-related amenities is determined by summing the aggregate net economic benefit for each activity across all activities. Using the amenity usage data and the average net economic benefit values in Table 11, the statewide net economic benefits of various natural resource-related and outdoor recreation activities are given in Table 12.

Table 12. Estimates of Net Economic Benefit by Activity in Iowa based on studies from the following regions (in 2006 dollars)

Activity	IA usage (day equivalents)	Intermountain and Northeast	Northeast	Intermountain
Camping ^{1,2}	1,402,414	\$51,187,146	\$49,555,743	\$51,965,430
Fishing ³	6,241,000	\$263,559,578	\$219,200,043	\$330,165,485
Hunting ³	3,912,000	\$200,692,683	\$198,104,177	\$202,738,437
Trail use ^{4,5}	1,365,138	\$39,249,372	\$39,249,372	\$39,249,372
Wildlife viewing ³	4,016,000	\$146,452,656	\$134,108,973	\$159,567,819
General recreation/park use	25,928,455	\$1,083,898,913	\$467,097,617	\$1,340,968,632
Total		\$1,785,040,347	\$1,107,315,925	\$2,124,655,176

¹Iowa DNR

²Iowa usage is the number of camping permits multiplied by 2 based on the assumption that each camping trip lasts 2 days. In reality this will probably lead to an underestimate of the net value, or consumer surplus, attributable to camping since many camping trips exceed 2 days in length.

³These figures are numbers of days for each activity based on estimates from the National Wildlife Survey (2006) and include resident as well as nonresident activity in Iowa.

⁴Net economic benefit for trail use based on work by C. Betz, J. Bergstrom, and J. Bowker. 2003. "A Contingent Trip Model for Estimating Rail-Trail Demand," *Journal of Environmental Planning and Management* 46(1):79-96. The estimate used is the average of \$18.46 and \$28.85 = \$23.85 (\$1999) and inflated to \$2006.

⁵Trail usage is based on estimates in this report.

Table 12 includes the estimated values for aggregate consumer surplus for camping, fishing, hunting, rails-to-trails, wildlife viewing and general recreation based on estimates of per-day consumer surplus associated with each activity in the Northeast, Intermountain, or both regions. Of these three sets of values, aggregate values based on the Northeast Region are the most conservative. Aggregate net economic benefit for camping is almost \$50 million and is based on the number of overnight campers in one of Iowa's state parks, assuming that each overnight visitor spends two days camping. The number of day-use equivalents for general recreation and park users is almost 26 million. This figure is calculated by combining one-day visits to state parks with one-half the estimated number of county park users. Multiplying the general recreation users in day equivalents by the average net economic benefit for the Northeast Region gives an aggregate value of roughly \$467 million. Based on 2006 numbers for the various types of wildlife-related recreational activities, the aggregate net economic surplus from fishing, hunting, and wildlife viewing was \$219 million, \$198 million and \$134 million, respectively. Finally, rails-to-trails recreation has a net economic benefit of almost \$39 million, based on an estimated 2006 rails-to-trails use of almost 1.4 million. When totaled across all categories, the aggregate net economic benefit from these three outdoor recreation and natural resource amenities is more than \$1.1 billion in 2006 dollars.

As Table 12 clearly indicates, the aggregate net economic benefit based on the Northeast Region studies are more conservative than when based on data from the

Intermountain Region, which produces a net economic benefit of \$2.1 billion. Here, the disparity originates from a general recreation net economic benefit of \$18 per day-use in the Northeast Region versus \$52 per day-use in the Intermountain Region. When based on studies from both the Intermountain and Northeast Regions, the estimated aggregate net economic benefit is approximately \$1.8 billion.

In addition to those mentioned earlier, estimates of aggregate net economic benefit should be interpreted cautiously on two accounts. First, it is possible that some individuals combined two or more activities into a single excursion, resulting in double counting when calculating the benefits. The problem here is a lack of good information on how the net economic benefit changes when multiple activities are enjoyed concurrently, or as part of the same excursion, such as taking a bike ride during an overnight camping trip. In this scenario it would be reasonable to expect that the aggregate net economic benefit is overestimated.

A second issue is that the recreational amenities shown in Table 11 represent only a subset of all recreational amenities enjoyed within the state. Due to a lack of data we cannot make any statement regarding the net economic value from activities such as swimming, canoeing and boating, rock climbing, and backpacking. As a result of these omissions, the total net economic benefit of natural and outdoor recreation amenities to Iowans will be underestimated.

Soil Erosion Controls Provide Benefits to Water Quality and Enhance Recreation Opportunities

A manifestation of the adverse effects of soil erosion on water quality is evident in the siltation occurring in many of Iowa's lakes and reservoirs. High levels of silting in the major Army Corps of Engineer dam and reservoir projects are shortening the economic life of these projects and lowering recreation benefits in these and other lakes in Iowa. This issue is vividly illustrated in the sequence of aerial photos of Saylorville reservoir between 1990 and 2005 (Figures 12.a, 12.b and 12.c).

Currently, attention is being directed at improving water quality in Iowa's rivers and lakes. Controlling nonpoint sources of water pollution typically means employing soil erosion control measures. Recent efforts to restore several Iowa lakes have led to increases in recreation activities and economic benefits. This relationship can be used to demonstrate the potential benefits available from investments in soil erosion measures to improve water quality in Iowa lakes.

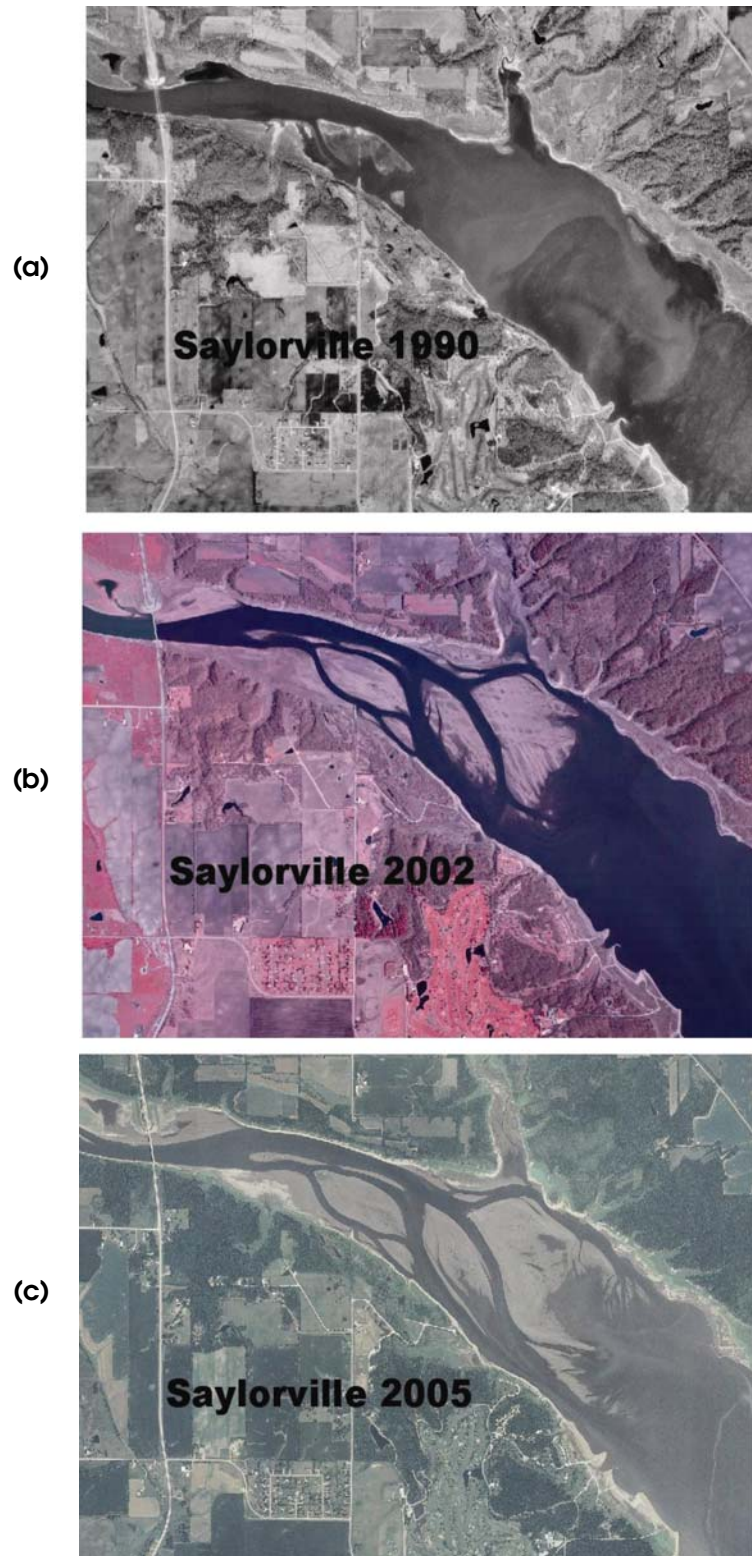


Figure 12. Saylorville Reservoir Between 1990 and 2005

The quality of water in Iowa lakes has been shown to affect the levels of recreational activities by participants and the economic value of those activities. A major determinant of water quality is sedimentation caused by soil erosion. While sedimentation also affects water quality in Iowa’s rivers and streams, research has not progressed enough to identify the magnitude of the impact.

Interdisciplinary study of the costs and benefits of water quality improvements is being conducted at Iowa State University.³⁷ The Iowa

Table 13. Cost of Four Iowa Lake Restoration Projects

Lake of Three Fires	\$3.2 million
Crystal Lake	\$4.8 million
Rock Creek Lake	\$3.5 million
Clear Lake	\$15.6 million

Lakes Restoration and Valuation Project is also addressing what types and values of benefits would result from efforts to restore and improve water quality in Iowa’s lakes. Several Iowa lakes have already gone through a restoration process involving dredging, along with some soil erosion control measures in the watershed. Table 13 shows the cost of restoration projects in four Iowa lakes.

The information from efforts to restore these lakes can be used to project total costs (TC) of water quality restoration in other priority lakes in Iowa. (Table 14). Improved water quality can be linked to increased level of recreational activities at Iowa lakes, with the result of increased economic value. The survey of visitors to Iowa lakes during 2002–2006 provides an indication of how Iowans would value improved water quality at Iowa lakes.

Table 14. Projected Benefits and Costs of Lake Restoration Projects

TNB ranking	Lake	TNB	TB	TC	TB/TC
3	Hickory Grove	275.94	277.80	1.86	149
14	Red Haw	54.65	55.10	0.45	122
12	Kent Park	61.28	61.99	0.71	87
11	Lake Anita	68.81	69.67	0.86	81
13	Springbrook	60.69	61.79	1.10	56
9	Lake Ahquabi	86.91	88.55	1.64	54
21	Hannen	25.45	25.95	0.49	53
18	Lake of the Hills	39.69	40.48	0.79	51
25	Central Park	22.23	22.75	0.52	44
6	Lake Geode	161.34	166.11	4.77	35
1	Big Creek	733.74	755.76	22.03	34
19	Viking	30.04	30.99	0.95	33
4	Lake McBride	218.18	226.21	8.03	28
2	Brushy Creek	490.70	517.20	26.50	20

³⁷ Egan, K., J. Herriges, C. Kling, and J. Downing. 2007. Valuing water quality as a function of water quality measures. *American Journal of Agricultural Economics*.

The projection of total benefits (TB) for each lake in Table 14 is an aggregation of valuations for recreational purposes of improving water quality at a set of Iowa lakes. The lakes in Table 14 are sorted by the highest net benefits (TNB = TB-TC) subject to a budget constraint of \$10 million for all lake restoration efforts. The results illustrate that although the \$10-million budget would only handle six lakes, a substantial level of economic benefit could be achieved. The results also indicate very robust benefit cost ratios (TB/TC) for all lakes in the list.

Although the data for the other types of outdoor amenities in Iowa are not as complete as those for lakes, it is possible to use the lakes restoration research to inform policy makers about the impact of additional public investments in other outdoor amenities. Table 15 summarizes key factors and direction of effect of

Table 15. Variables and Coefficient Sign of Factors affecting Lake Visitations

Variable	Qualitative Sign
Price (Travel Cost)	-
Log(Acres)	+
Ramp	+
State Park	+
Facilities	+
Wake	+

factors related to visits and benefits derived from use of Iowa lakes. Lower travel costs, or proximity to the lake, size of the lake, attributes and presence of facilities are all positively related to visitation and levels of benefits .

Since many of the lakes are embedded in state or county parks, these findings can be used to assess potential affects on parks. The results suggest that the number of park visits, and hence the benefits generated, are related to proximity to population centers, size of the park, and amenities of the park. Benefits could be increased by investing in parks near population centers, expanding the size of park holdings, and investing in facility improvements. Future research could more extensively investigate and estimate values for the relationship of park characteristics and amenities to numbers of visits and the benefits derived.

Impact of Additional Natural Resource Investments.

Many of the recent natural resource-based projects in Iowa have been facilitated with funds from the REAP program. These state dollars are leveraged with local funds to develop and/or improve outdoor recreation facilities. Not surprisingly, funding limitations result in only about one-fourth of the eligible projects being funded. The list of unfunded project proposals from 2006 offers an indication of the types of projects that could be funded with additional DNR budget. The research information in this report can be used to provide estimates of the economic impact and benefit these projects could offer.

Table 16 summarizes the location and size of unfunded REAP project proposals along with our assessment of potential economic impacts. Since most of the proposals were submitted through CCB, we assume that the new parks will be used in a manner similar to other parks in the county. The state REAP funds requested for this set of projects total \$4.26 million with at least \$2.5 million in local matches. (Not all applications had local matches clearly identified.) Since most of these projects appear to be managed by CCB, visits and spending rates for these proposed projects were estimated by applying the same methods that were used to project economic impacts of county parks.

By using these methods for projects that included new park facilities, we project an additional 3.6 million visitors and \$90.4 million in spending. Increased trails would add 17,151 users and \$137,200 in spending. The effects of adding new campground spaces have not been included, but presumably would lead to additional camping-related spending and economic benefits.

Based on calculations using I-O methods to estimate secondary and job effects, approximately 1,062 jobs, \$22.4 million in income and \$143.3 million in spending would be associated with recreation activities at these REAP-funded facilities.

Beyond the county conservation board are many local community park and trail projects. The DNR and state agencies are involved in many of these projects, but they are too numerous to inventory for this project.

Future Challenges and Opportunities

In 2006 approximately 45% of Iowa's population was rural. In 1980 the rural share of the population was more than half but has steadily declined so that since 1990 the urban share of the population has actually become larger than the rural share (see section 2.2).³⁸

The fact that most Iowans live in an urban environment and tend not to derive their livelihoods from the land can lead to tension between rural residents who do. If we look at absolute numbers alone, it is often the urban dwellers as a group who derive the greatest benefit from natural resource and recreational opportunities even though these amenities often exist in rural areas. Agricultural producers and other industries that use natural resources such as land relatively intensively to generate income, often resent the city dwellers when they try to impose environmental rules and regulations

³⁸ <http://www.ers.usda.gov/StateFacts/IA.htm> (last accessed Oct. 18, 2007)

Table 16. Potential Economic Impact of 2006 Unfunded REAP Projects

County	Park/Trail	Acres (parks) /Miles	Est. Visit		Est. Expenditures (\$)		Funding (\$)	
			Park	Trail	Park	Trail	Grant	Match
Mills	Park	4	83,851		2,115,979		156,798	
Des Moines	Park	52	400,026		10,094,653		169,962	58,228
Des Moines	Trail	3		4,906		39,247		
Black Hawk	Park	177	580,345		14,645,018		100,000	300,000
Iowa	building						366,123	237,894
Kossuth	Park	128	91,317		2,304,376		156,800	36,600
Emmet	building						282,910	217,151
Clay	Park	67	94,054		2,373,460		117,900	
Cherokee	Park	78	203,586		5,137,487		208,898	150,000
Shelby	Campground space						80,250	30,100
Guthrie	Trail	6		8,432		67,455	175,000	437,300
Jackson	Trail (Also have bridge)	2		2,913		23,303	142,958	54,650
Page	Park	207	90,597		2,286,226		265,000	
Chickasaw	Campground space						100,000	18,300
Clay	Park	96	94,054		2,373,460		150,800	
Benton	Park	37	415,286		10,479,744		136,400	20,000
Tama	Park	123	261,677		6,603,429		229,418	57,355
Dallas	Park	76	485,539		12,252,587		95,324	
Dallas	Park	48	485,539		12,252,587		247,300	
Linn	Campground space						200,000	40,000
Davis	Campground space						45,000	
Grundy	Trail	1		900		7,201	65,776	50,000
Polk	Trail maintenance equipment						55,000	
Union	Campground space						83,171	
Carroll	Parks	80	205,235		5,179,095		150,000	132,930
Hardin	Facility improvement						28,000	46,000
Hamilton	Park	157	90,748		2,290,025		151,673	376,100
Dickinson	building						298,932	223,711
Total		182,674,636	874,683		\$4,609,794,440	\$6,997,463	\$217,229,043	\$2,486,319

on land use. As land use restrictions and environmental regulations limit farmers' alternatives for production, it is natural for them to resist such changes especially when they perceive there to be little benefit to themselves with "outsiders" from the urban centers reaping the majority of the benefits. To satisfy environmental regulations as well as the demand for outdoor recreation and wildlife-related activities by non-farmers will likely require some combination of policy involving direct payments to farmers as well as additional public good funding.³⁹

In practice a number of alternative programs such as the conservation reserve program (CRP) can be used to encourage landowners to manage sensitive lands in a manner that reduces problems associated with soil degradation and agricultural runoff, enhances aesthetic beauty, and provides habitat for wildlife. These in turn can improve wildlife-related opportunities and increase the value derived from recreating in these areas. However, the success of such programs will be affected by the increased pressure to bring environmentally sensitive land back into crop production because of increases in agricultural commodity prices such as corn.

The recent and rapid growth of the corn ethanol-based biofuels industry has driven up corn prices and is putting pressure on farmers to bring additional acreage into crop production. Corn prices increased from the \$2.00/bushel range in summer of 2006 to \$3.50/bushel by the end of 2006 and have stayed in that range. Nationwide, corn acreage has increased from 78 million to 93 million acres planted between 2006 and 2007. The response has been similar in Iowa, with acres planted in corn increasing from 12.6 million in 2006 to 13.9 million in 2007. Much of the increased planting is shifting acres from soybeans, but also includes converting idled acres or pastureland.

If support for programs like CRP declines the results may be that fewer acres are signed up or payments per acre covered decrease. In this case, higher corn prices create an incentive for farmers to return land to agricultural production. Clearly the amount of wildlife habitat will be reduced if more idle prairie land is converted to agricultural use. In addition, problems from higher agricultural commodity prices may arise in terms of the state's natural amenities. Higher prices encourage production on land that might include buffer strips designed to limit runoff. Furthermore, higher application of fertilizers and chemicals can exacerbate environmental problems associated with runoff. Of course, a reduction in wildlife habitat will result in a decrease in wildlife. In turn, any reduction in wildlife will reduce the benefits from wildlife-related recreation as well as the support for those activities. For example, Figure 13 presents historical data on the numbers of

³⁹ Feinerman, E. and M.H.C. Komen. (2003). "Agrienvironmental Instruments for an Integrated Rural Policy: An Economic Analysis," *Journal of Agricultural Economics* 54 (March):1-20.

pheasants and pheasant hunters. The data show that a reduction in the number of pheasants within the state has been followed by a reduction in the number of hunters.

In the future, tension is likely to exist between industries that would like to use natural resources to maximize profits and those who would like to see greater protection and preservation of natural resources. However, production activities in industries such as agriculture and forestry could strike a balance between environmental responsibility while providing profit maximization. In the event that such a balance cannot be reached in the market when left to its own devices, it may be appropriate for some type of government policy to be implemented to strike a balance between private and public interests.

Still, there exists opportunities for enhancing amenities and providing amenity benefits to Iowans. Development of the Banner Lakes at Summerset State Park, the newest state park in Iowa, demonstrates that continued progress can be made to provide more amenity alternatives in the state. These benefits improve residents' quality of life, give young and educated persons more incentive to stay in the state and portray a progressive image for the state that will be enticing to nonresidents.

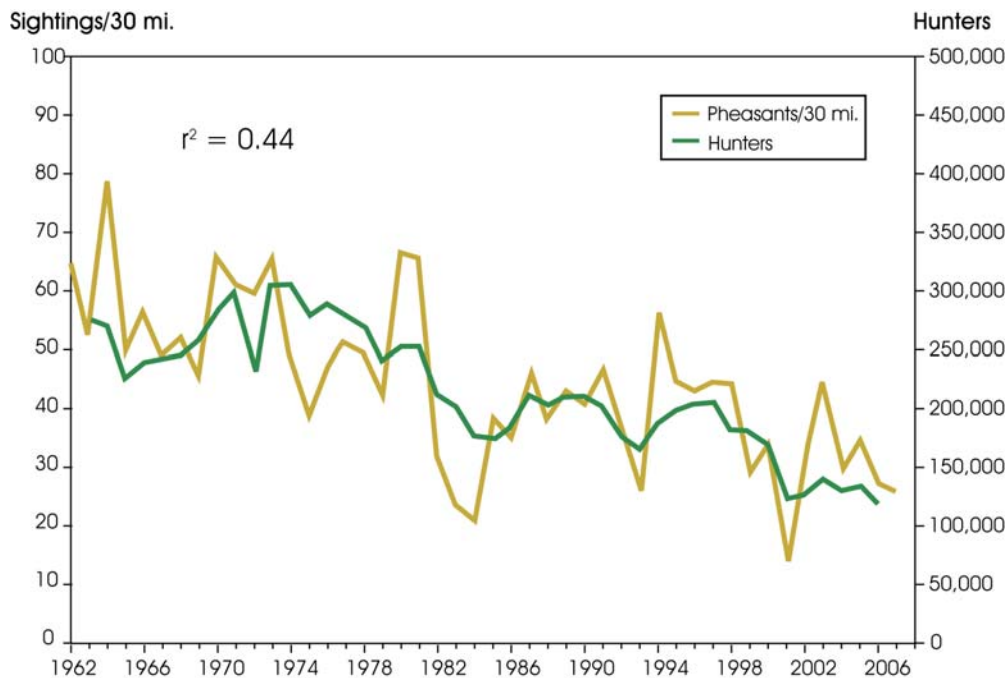


Figure 13. Index of Pheasant Numbers vs. Estimated Number of Residents and Nonresident Pheasant Hunters

Summary and Conclusions

Iowa's natural resource base supports a highly productive agricultural system as well as an increasingly important outdoor recreation industry. A number of trends are likely to affect how well Iowa's natural resource base will meet the needs of those two interests. An increasingly urban population in Iowa expects that the quality and quantity of outdoor environment and recreational resources will be maintained. Iowa's efforts to participate in new economic development will require maintaining existing quality while creating new recreational opportunities. National competition for quality jobs and the workers to fill those positions creates the need for Iowa to have competitive recreational opportunities and natural resources.

The rapid growth of the corn-based ethanol industry and the growing interest in other biofuels is challenging Iowa's agricultural production capacity and creating strong incentives to bring more acres into production. As Iowa's production agriculture responds to new opportunities in renewable fuel, it is important that recreational amenities not be displaced or degraded during the process. This study has attempted to point out the importance of a recreation industry that is derived from the natural environment and identify the value that Iowans place on their natural resources. The following statements summarize the results of our analysis:

1. Outdoor recreation opportunities are important to Iowans. More than 25 million visits are made to Iowa state parks and lakes annually. County park visits are estimated to be at a comparable level of about 23 million visitor groups. Other recreation sites such as city parks, state forest and preserves and river-based activities were not examined in this study, but also contribute to the outdoor recreation package enjoyed by Iowans. These recreation sites provide opportunities for hunting, fishing, boating, swimming, wildlife viewing, hiking, riding, picnicking and just relaxing.
2. Recreation is a large industry in Iowa. The outdoor recreation activities and visits to parks and lakes generate considerable spending that translates into substantial job and payroll totals. For the four recreation amenities with usable data (lakes, state parks, county parks and trails) we estimate spending levels of \$2.63 billion and 50 million visits. Including secondary or multiplier effects implies that more than 27,400 jobs and \$580 million in income are being generated in the Iowa recreation industry.
3. Recreation amenities and activities in Iowa generate economic benefits beyond spending impacts. In addition to the local jobs and income generated by the process of recreation spending in Iowa, there exists a surplus, or net economic

value to Iowans, which is the difference between what consumers are willing to pay for an amenity and what they actually pay. National studies have estimated the economic value individuals place on a day of different types of recreation, including camping, fishing, hunting, wildlife viewing, hiking, swimming and general park activities. When these estimates are applied to the rates observed in Iowa, the economic value for the rates of participation in these outdoor recreation activities yielded aggregate economic values exceeding \$1.1 billion annually, beyond the spending impacts identified earlier.

4. Recreation opportunities and natural resources are important to retaining and attracting skilled workers in the state. Iowa, like many other Midwestern states, has had to deal with problems associated with the “brain drain” of highly educated and skilled individuals leaving rural areas, and often the state altogether. Quality of life factors are increasingly important considerations in the competition for recruiting and retaining entrepreneurs and skilled workers. National and regional studies, which include Iowa, have consistently identified quality natural resources as an important factor in rates of economic growth. These findings hold true even for non-coastal and non-mountainous states.
5. New investments to improve the environment and add recreation opportunities generate economic benefits. Improving water quality through erosion and runoff controls can translate into enhanced recreation opportunities. The Iowa Lakes Valuation Project has identified recreational benefits related to water quality in lakes and watersheds and that are substantially greater than costs of restoration. Expanded parks and facilities also demonstrate sizeable social benefits relative to costs.