



File Code: 2330

Date: March 19, 2014

Route To: (Recreation Program Manager)

Subject: Estimation of Horse and Bicycle Trail Use for CY 2013

To: File

This memo provides an estimate of horse and bike trail use on the Hoosier National Forest during calendar year 2013. The methodology used to prepare this estimate has been reviewed by the USDA Forest Service North Central Forest Experiment Station and found to be acceptable. The reader must bear in mind that the figures presented below are *only an estimate* of trail use from which one may draw *general* conclusions.

**Background.** Horse and bike riders who ride on Hoosier National Forest trails must buy a daily or annual trail permit. Thus, sales records can be used to estimate trail use on an annual basis.

**Data needs.** Three pieces of information are needed to estimate trail use by horse and bike riders from permit sales records. First, we need to know how many times annual permit holders used their permit. Second, we need to know how many people used the trails without a permit – the number of noncompliant adult riders, who were required to have a permit, plus the number of youth riders, who were not required to have a permit. Third, we need to know the percentages of horse riders and bike riders.

**Data collected.** During the 2013 calendar year, field personnel collected data on trail use while performing compliance checks for permits. Sample days and locations were not selected randomly, but determined by each field person's patrol schedule. Sample days included most weekends (Friday, Saturday, and Sunday), holidays, and some weekdays. Fifty-three patrol days were completed during which trails were visited 163 times (total patrol days and trail contacts were reduced this calendar year due to injuries and manpower). On each encounter with trail users, field personnel noted user type (hike, bike, or horse), user age group (adult, youth), and whether or not each adult riding a horse or bike had an annual or daily trail permit. Many riders who possessed annual permits were asked to estimate the number of times they planned to ride during the year so that an "average rides per year per annual permit purchased" figure could be estimated. The number of users hiking the multi-use trail systems were recorded for informational purposes, but were not included in the trail use estimate because hikers do not need a permit.

**Methodology.** The number of annual permits sold was multiplied by 15.1 – the average rides per year per annual permit purchased (using 2009 data) – and added to the number of daily permits sold, providing an estimate of the number of compliant adult rides. The number of compliant adult rides was multiplied by a noncompliance rate and a youth rate to determine the number of noncompliant rides and the number of youth rides, respectively. Addition of the compliant adult rides, noncompliant adult rides, and youth rides provided an estimate of the total number of rides by horse and bike riders. This total was multiplied by the percentages of horse riders and bike riders observed to estimate the number of rides for each user type.



**Results.** Field personnel contacted 158 trail users: 113 adult hikers, 0 youth hikers, 6 adult bike riders, 0 youth bike riders, 36 adult horse riders, and 3 youth horse riders. Of the 36 adult horse riders, 21 had annual trail permits, 15 had daily trail permits.

A total of 4,462 [5,180] daily trail permits and 1,466 [1,538] annual trail permits were sold in calendar year 2013. An estimated 29,581 [28,971] rides occurred on Hoosier National Forest trails during that time. Summary tables and a detailed description of the methodology and its application are attached.

**Trends and Analysis.** The estimated number of rides for calendar year 2013 increased from 2012. The number of daily permits sold decreased by roughly 14% from 2012 while the number of annual permits sold decreased by about 4%. The youth rate was 6.4% and the compliance rate was 95.5%; two factors which yielded estimates that increased the total number of rides for the calendar year.

**Recommendations.** It is recommended that data collection continue, with attention given to updating the Average Rider Per Year figure.

*/s/ Chuck Stewart*

CHARLES L. STEWART

Forestry Technician

**Table 1. Permit Sales and Trail Use Estimate for CY2013.**

Number of Rides	Permits Sold	Average RPY	Adjustment Factors	Estimated Rides
Daily	4,462			4,462
Annual	1,466	15.1		22,136
Adj. for noncompliance	26,598		4.5%	1,209
Adj. for youth	27,807		2.0%	1,774
<b>Total</b>				<b>29,581</b>

**Table 2. Percentage Breakdown by User Type for CY2013.**

User Type	Percent	Total
Horse	87.2%	25,805
Bike	12.8%	3,776
<b>Total</b>	<b>100.0%</b>	<b>29,581</b>

**Table 5. Trends in Observed User Types.**

User Type	2009		2010		2011		2012		2013	
	Number	Percent	Number	Percent	Number	Percent	Percent	Number	Number	Percent
Hikers	428	39%	87	19%	70	39%	0	0%	113	72%
Bike Riders	216	20%	56	12%	13	7%	0	0%	6	4%
Horse Riders	453	41%	326	70%	96	54%	50	100%	39	25%
<b>Total</b>	<b>1,097</b>	<b>100%</b>	<b>469</b>	<b>100%</b>	<b>179</b>	<b>100%</b>	<b>50</b>	<b>100%</b>	<b>50</b>	<b>100%</b>

**Table 6. Trends in Permit Sales, Youth Rates, and Compliance Rates.**

Descriptor	2009	2010	2011	2012	2013
Daily's Sold	6,686	6,591	5,548	5,180	4,462
Cumulative Daily's Sold	94,580	101,171	106,719	111,899	116,361
Annual's Sold	1,928	1,836	1,592	1,538	1,466
Cumulative Annual's Sold	19,884	21,720	23,312	24,850	26,316
Annual Revenue	\$91,765.00	\$90,352.00	\$76,765.00	\$74,382.00	\$66,956.00
Cumulative Annual Revenue	\$773,532.00	\$863,884.00	\$940,649.00	\$1,015,031.00	\$1,081,987.00
Average Rides Per Year	15.1	15.1 (CY09)	15.1 (CY09)	15.1 (CY09)	15.1 (CY09)
Compliance Rate	97.8%	95.6%	98.1%	100.0%	95.5%
Youth Rate	6.1%	5.2%	6.3%	2.0%	6.4%

**Table 7. Trends in Estimated Trail Use.**

Source	2009	2010	2011	2012	2013
<b>Permit Sales:</b>					
Daily	6,686	6,591	5,548	5,180	4,462
Annual	29,172	27,723	24,039	23,233	22,136
<b>Adjustments:</b>					
Noncompliance	799	1,516	568	0	1,209
Youth	2,246	1,875	1,901	568	1,774
<b>Estimated Rides</b>	<b>38,903</b>	<b>37,705</b>	<b>32,056</b>	<b>28,971</b>	<b>29,581</b>

**Table 8. Trends in Estimated Horse and Bike Rides.**

User Type	2009		2010		2011		2012		2013	
	Rides	Percent	Rides	Percent	Rides	Percent	Rides	Percent	Rides	Percent
<b>Horse Riders</b>	26,342	68%	32,178	85%	28,302	88%	28,971	100%	25,805	87%
<b>Bike Riders</b>	12,561	32%	5,527	15%	3,754	12%	0	0%	3,776	13%
<b>Estimated Rides</b>	<b>38,903</b>	<b>100%</b>	<b>37,705</b>	<b>100%</b>	<b>32,056</b>	<b>100%</b>	<b>28,971</b>	<b>100%</b>	<b>29,581</b>	<b>100%</b>

## Terminology

**Adult:** any user 17 years of age and older.

**Youth:** any user 16 years of age and younger.

**Ride:** one day of trail use of any time length on a forest trail by a horse or bike rider.

**Rides per Year (RPY):** the number of times a purchaser of an annual trail permit expects to ride, or use their permit, during the year.

## Methodology as applied to CY2013 Data

**Step 1:** Estimate the number of rides per annual trail permit purchased. Use the estimate to convert the number of annual trail permits sold into the number of rides for all annual trail permits sold. Add that product to the number of daily trail permits sold (since each daily trail permit is equal to one ride) to estimate the number of compliant adult rides.

$(\text{Total RPY}) / (\text{Total Users Surveyed}) = \text{Rides per Annual Trail Permit};$

$(\text{Rides per Annual Trail Permit}) \times (\text{Annual Permits Sold}) = \text{Rides for all Annual Trail Permits Sold};$

$(\text{Rides for all Annual Trail Permits Sold}) + (\text{Daily Permits Sold}) = \text{Compliant Adult Rides};$

15.1 Rides per Annual Trail Permit;

$15.1 \times 1,466 = 22,136$  Rides for all Annual Trail Permits Sold;

$22,136 + 4,462 = 26,598$  Compliant Adult Rides.

**Step 2:** Calculate a noncompliance rate and a youth rate from field data. Multiply *compliant adult rides* by the noncompliance rate to estimate *noncompliant adult rides*. Multiply the sum of *compliant adult rides* and *noncompliant adult rides* by the youth rate to estimate *youth rides* (since youth were observed riding with compliant and noncompliant adults). The sum of *compliant adult rides*, *noncompliant adult rides*, and *youth rides* provides an estimate of trail use by horse and bike riders.

From Field Observations of bike and horse riders:

$(\text{Noncompliant Adult Riders}) / (\text{Compliant Adult Riders} + \text{Noncompliant Adult Riders}) = \text{Noncompliance Rate};$

$(\text{Youth Riders}) / (\text{Compliant Adult Riders} + \text{Noncompliant Adult Riders} + \text{Youth Riders}) = \text{Youth Rate}.$

$(2 + 0) / ((36 + 2) + (6 + 0)) = 2 / 44 = 0.045$  Non-compliance Rate;

$(3 + 0) / ((36 + 2 + 3) + (0 + 6 + 0)) = 3 / 47 = 0.064$  Youth Rate;

Estimate the number of noncompliant adult rides, youth rides, and total rides:

$(\text{Compliant Adult Rides}) \times (\text{Noncompliance Rate}) = \text{Noncompliant Adult Rides};$

$(\text{Compliant Adult Rides} + \text{Noncompliant Adult Rides}) \times (\text{Youth Rate}) = \text{Youth Rides};$

$(\text{Compliant Adult Rides}) + (\text{Noncompliant Adult Rides}) + (\text{Youth Rides}) = \text{Total Rides}$

$26,598 \times 0.045 = 1,209$  Non-compliant Adult Rides;

$(26,598 + 1,209) \times 0.064 = 1,774$  Youth Rides;

$26,598 + 1,209 + 1,774 = 29,581$  Total Rides, or Trail Use by Horse and Bike Riders.

**Step 3:** Determine the percentages of horse and bike riders.

$(\text{Horse Riders}) / (\text{Total Horse and Bike Riders}) = \text{Percent Horse Riders};$

$(\text{Bike Riders}) / (\text{Total Horse and Bike Riders}) = \text{Percent Bike Riders};$

$(\text{Percent Horse Riders}) \times (\text{Total Rides}) = \text{Total Horse Rides};$

$(\text{Percent Bike Riders}) \times (\text{Total Rides}) = \text{Total Bike Rides}.$

$41 / (41 + 6) = 0.872 = 87.2\% \text{ Horse Riders};$

$6 / (41 + 6) = 0.128 = 12.8\% \text{ Bike Riders};$

$0.872 \times 29,581 = 25,805 \text{ Horse Rides};$

$0.128 \times 29,581 = 3,776 \text{ Bike Rides}.$